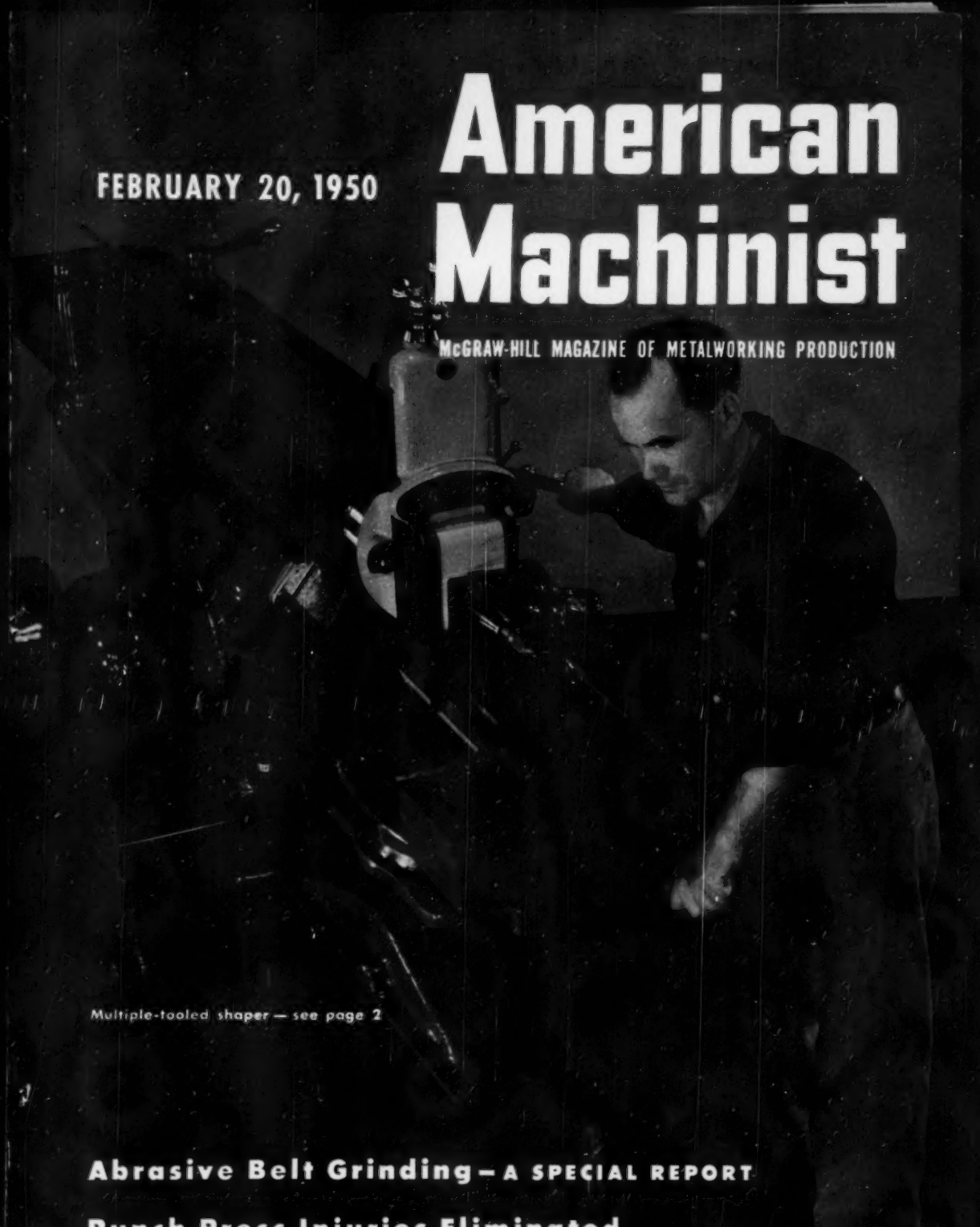
FEBRUARY 20, 1950

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Multiple-tooled shaper — see page 2

Abrasive Belt Grinding — A SPECIAL REPORT

Punch Press Injuries Eliminated

every pair a perfect match

...because these mating water meter parts are made for each other, at the same time, on the same Heald Bore-Matic

No more selective assembly. No more wasting of mis-fit parts. The water meter cones shown above are now precision borized — a pair at a time — on a new Heald Model 221 Bore-Matic. This high-speed, high-precision machine is tooled up to perform six different borizing operations on each cone — automatically, and without possibility of error. Result: All like parts are identical and interchangeable. And every pair snaps together with a perfect fit.

An hour saved today is worth more than ever before. And with competition back in the saddle again, it may mean the difference between producing at a profit — just breaking even — or taking a loss on the job.

Thats why it's so important to remember that more precision in precision finishing can help you save time and cut costs all along the line. Remember, too, that when it comes to precision finishing, it pays to come to Heald.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

HEALD

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

BURNHAM FINNEY.....Editor
E. J. TANGERMAN.....Managing Editor

•

RUPERT LE GRAND.....Associate Editor
BEN BROSHEER (Chicago)..Associate Editor
ANDERSON ASHBURN....Associate Editor
H. E. LINSLEY.....Associate Editor
CHESTER RICKER (Detroit)..Associate Editor
MILES J. ROWAN.....Associate Editor

•

CHARLES D. EMERSON.....Assistant Editor
ROBERT W. TAYLOR.....Assistant Editor
WM. M. STOCKER, JR.....Assistant Editor

•

SYDNEY OXBERRY.....Art Director
RICHARD ROOMAN.....Assistant
ANNE PALMER.....Makeup

•

LIONEL J. HOLMES.....News Editor
STANLEY BRAMS.....Detroit
PAUL LEACH, JR.....Washington
ROBERT E. COCHRAN.....Cleveland
TED PALMER.....San Francisco
JAMES LEE.....Houston
E. DALTON WHITE.....Atlanta
FREDERICK BREWSTER.....London
BOYD FRANCE.....Paris
HENRY BAGLEY.....Rio de Janeiro
JOHN CHRISTIE.....Frankfurt
ALPHEUS JESSUP.....Tokyo
HERBERT LEOPOLD.....Melbourne
JOSEPH GAMBATESE.....Labor Editor

•

DEXTER KEEZER...Director Economics Dept.

GEORGE B. BRYANT, Jr.....Washington

RUSSELL F. ANDERSON..Editor World News

FRED H. COLVIN.....Editor Emeritus

ABC ABP

ALBERT HAUPTLI.....Publisher
WILLIAM E. KENNEDY.....Asst. Publisher

•

COPYRIGHT 1950 by McGraw-Hill Publishing Company, Inc. All rights reserved.

Published every other Thursday. Price 50c per copy. Allow ten days for change of address. Subscription Rates: United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada, $7 for one year, $11 for two years, $14 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 a year, $30 for two years, $40 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter, August 13, 1943, at Post Office, New York, N.Y., under the act of March 3, 1879. Printed in U.S.A. Return postage guaranteed.

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index.

CONTENTS for FEBRUARY 20, 1950

VOL. 94 NO. 4

Cover — *Operation pictured is described on page 2*

ADMINISTRATION

Editorial	*Burnham Finney*	95
Punch Press Injuries Can Be Eliminated	*Edward G. Holtzman*	97
Our Industrial Machine Is Running Down	*James H. McGraw, Jr.*	120

SPECIAL REPORT

Equipment for Abrasive Belt Grinding	*Rupert Le Grand*	113

ENGINEERING

It Pays to Sell Inventory Control	*D. S. Lisberger*	106
Boost Output of Multiple-slide Presses—II	*Otto C. Held*	124

INSPECTION

Electrical Conduit Forms Strong Gage Members	*Roger Isetts*	133
Tailstock Indicator Checks Depth of Drill	*R. A. Lachmann*	134
Rough Miller-Table Feed Gage	*Alphonse P. Berube*	135

MATERIAL CUTTING, FORMING

Shaving and Deburring Finish Gears Faster	*Ben Brosheer*	110
Hood Exhausts Fog from Race Hardening	*E. J. Tangerman*	112
Spinning Lathe Produces Large Flange	*Lester J. Scholl*	131
Drillpress and Hacksaw Cut off Rod	*David C. Williams*	132
Gear Train Substitute for Dividing Head	*Federico Strasser*	133
Power-Driven Cutter Machines Sockets	*H. G. Frommer*	133
Floating-Drive Line Reamer Aligns Holes	*H. G. Frommer*	134
Shop-Devised Rotary Saw Strip-Cuts Sheet Metal	*Dan Penway*	134
Drivers Chucked to Operate Drills	*Lewis W. Spaulding*	135
Carbide Chip Breaker on Drilling Job	*Frederick G. Hauck*	136
Sharpening Carbide-Tipped Reamers	*Del Phino*	147
Approach Distance for Milling & Hobbing	*V. G. Hotchkiss*	149

TOOLING

Shaping Multiplies Its Cutting Edges		101
Talented Tooling		104
Short Cuts	*Charles L. Leeper*	129
Sectional Dies Cut Costs	*J. R. Paquin*	121
Lathe-Milling Attachment Cuts Leadscrew	*Frank Biechele*	131
Eccentric Mechanism Replaces Indirect Clutch	*Leo Keller*	132
Side-Pressure Fixture Clamps Washers	*Fred H. Lingenfelder*	132
Wrapped Chain Rotates Cleaning Cylinder	*Joseph E. Kramer*	134
Eccentric Center on Miller Shifts Easily	*S. Framurz*	134
Stock Stop Forces Strip Against Guide	*Federico Strasser*	135
Guides Align Tap for Rethreading Sockets	*W. Lewis*	136

NEWS OF METALWORKING

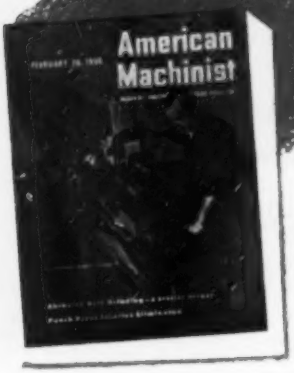
Spot News	91	Detroit News	142
Gaging Metalworking	92	Names in the News	143

DEPARTMENTS

Tips to Top Shop Men	109	Round Table Discussion	174
Reference Book Sheets	147	To the Editor	200
Talking Shop	153	New Books	204
Equipment Materials, Parts	154	Free Literature Available	233

PUBLISHED BY McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42nd St., New York 18, N.Y.
Cables: "McGRAW-HILL, New York"

James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Senior Vice-President, Publications Division; Nelson Bond, Vice-President and Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Vice-President and Director of Circulation



Chips and QUIPS

Our Cover . . . Shaping the male half of an alloy cast-iron glass mold with a multiple-tool setup to tolerances of plus or minus 0.0005 in. is depicted on our cover. Four single ½x½-in. HSS bits machine all vertical surfaces at once. The female mold half is produced similarly, so multiple tooling cuts time and increases accuracy of fit.

The problem on this mold job was to obtain 100% interchangeability in production, difficult by more conventional machining methods, but important in cutting molding-machine down time. At a cutting speed of 70 fpm with 18-in. stroke and 0.010-in. feed per stroke, extremely long tool life between grinds was attained and tolerance was maintained easily.

Such a setup will on occasion cut cost below that for milling, considering ease and flexibility of setup, low relative cost of cutters and longer life between grinds. In effect, such tooling makes the shaper a production machine. This and other examples are detailed in the article in this issue, "Shaping Multiplies Its Cutting Edges."

Painted in the standard color scheme of Pennsylvania Power & Light Company (worked out by the Debevoise Company), this machine is a 32-in. heavy-duty Cincinnati Universal shaper, with the vise mounted on the tilting top side of the table. Eddie Betts of Marsh Studios took the picture.

No Injuries . . . Wagner Electric organized a safety program in its punch-press shop, achieved two accident-free years for the first time in 40. Because we haven't heard of any other punch-press shop that can claim such a record, we bring details of the program. Edward A. Holtzman tells of the schooling, guards, painting and other elements.

Belt Grinding . . . During World War II, compound-curved aircraft parts like propeller blades presented a difficult problem in balancing and finishing. Abrasive-belt grinding proved to be the answer, widening its applications over the limited casting-finishing jobs previously familiar. Since the War, other applications have been developed, so we felt that a Special Report was in order. In our current one, Rupert LeGrand covers belt cutting speeds, work pressure, choice of abrasive, coolants, sizes and types of machines, fixture details, data and production times on specific jobs, and the economics.

Sectional Dies . . . J. R. Paquin, tool engineer at Underwood Corp., takes up herewith such advantages of sectional dies as less-expensive machining of irregular openings and quick replacement of frail inserts in case of breakage. He gives rules for sectioning to avoid weak sections, shows how simple dies can be applied to the manufacture of intricate parts . . . Tool engineers will also like the Talented Tooling items, one a riveter attachment, one a press ejector, the third a shop-built bender and the fourth showing how hand indexing controls heavy rolls for groove milling.

Shaving . . . Late last Fall, Ben Broshear, our Chicago editor, swung west to the agricultural-implement plants out where the tall corn grows. Among the stories he brought back is one describing finishing methods for transmission gears at the Dubuque, Ia., works of John Deere . . . Otto Held goes on with his step-by-step explanation of how to squeeze top production from a multiple-slide machine.

More Articles . . . Our indexer, upon completion of our 1949 index, announces that we published 1019 articles in '49, as compared with 887 in '48, 730 in '47 and 579 in '46. Some 868 were signed by 415 different authors, compared with 446 in '48, 409 in '47 and 388 in '48. More and shorter articles is your preference, hence our motto.

Coming . . . Mar. 6 *AM* will include a Special Report on Materials Handling Auxiliaries, showing the "gadgets" that speed up specific operations with trucks, conveyors, hoists, and cranes. There will be articles on how to correct a worker, on 2-station dies, on high-speed machining, on a stepped die, on high-speed hobbing of steel gears, and on avoiding expensive fixtures in surface grinding.

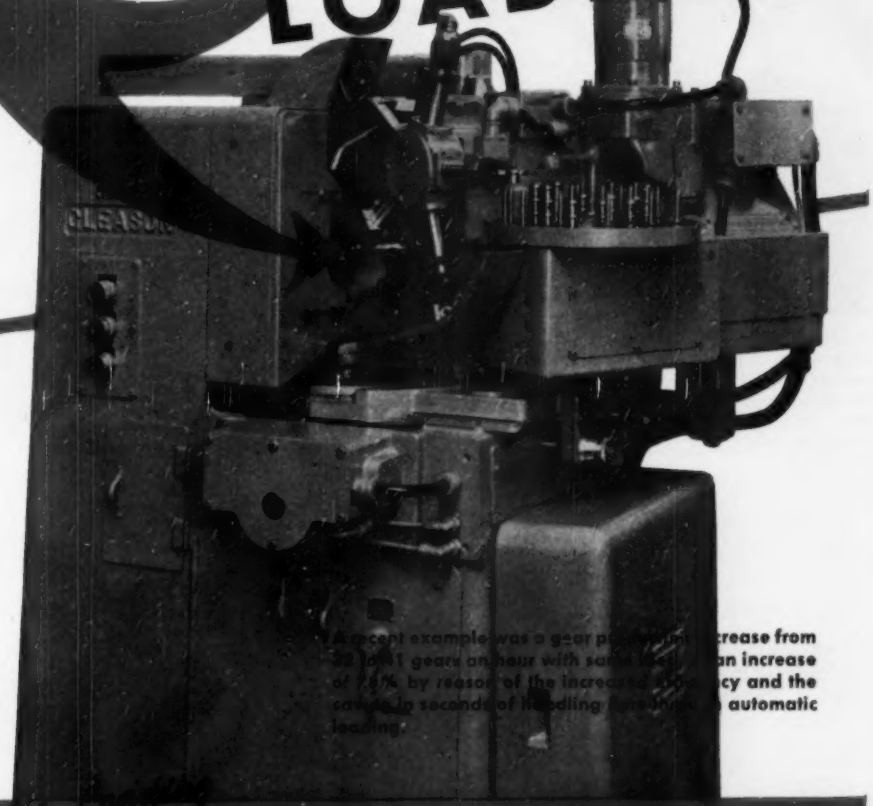
CONTROL SALESMAN . . . D. S. Linberger is a Californian gone East. Born in San Francisco, he was graduated from Stanford University in 1937 and got his master's from the Harvard Graduate School of Business in 1939. He joined the General Electric Company in July of that year, starting at the Philadelphia Works. A graduate of the GE Production Training Course, he became supervisor of inventory control at Philadelphia in 1942, and was advanced to production supervisor of the Air Circuit Breaker Division in 1947. In 1949, he moved on to Schenectady to become supervisor of inventory control for the Apparatus Dept. The modern approach, which this department used to tackle its inventory problem, is described in "It Pays to Sell Inventory Control" in this issue.

Mr. Linberger is a skier and a sports enthusiast, lives in Loudonville, N. Y., with his wife and son.

COUNT THE INCREASED OUTPUT THROUGH SECONDS SAVED

with

AUTOMATIC LOADING



A recent example was a gear p[illegible] crease from [illegible] gears an hour with sa[illegible] an increase of [illegible]% by reason of the increased [illegible]cy and the [illegible] seconds of handling [illegible] automatic loading.

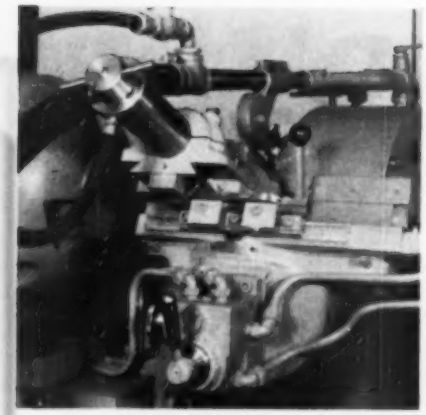
Automatic Loading

provides steady continuous production without needless "down time" for the machine . . . furnishes uninterrupted operation at peak efficiency with close control of actual cutting . . . produces high quality spiral bevel, Zerol bevel and hypoid gears. And . . . The machine can be used for short run work when the loader is not required.

GLEASON *Works*
1000 University Avenue
Rochester 3, N.Y., U.S.A.

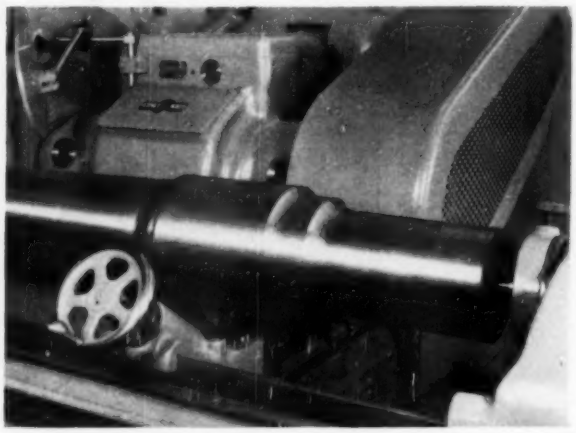
Builders of Bevel Gear Machinery for Over Eighty Years

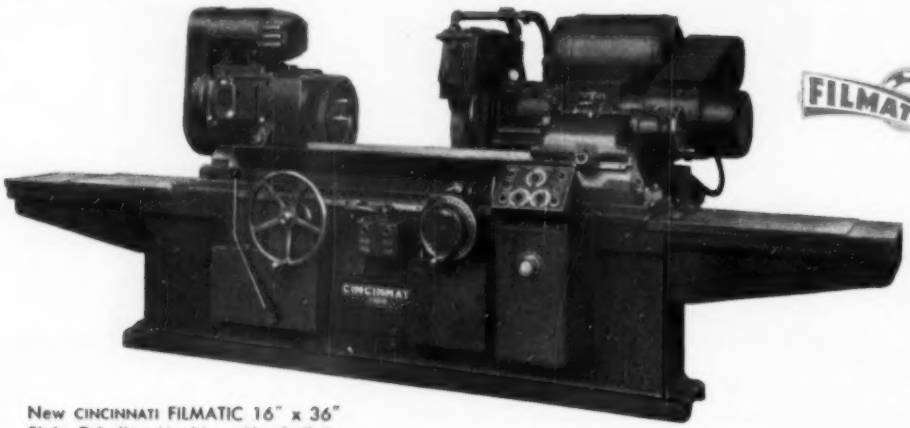
Hard Taskmaster for Center Type Quickly Ground



Hydraulic profile grinding wheel truing unit, rear view. Cams can be readily interchanged to true various profiles on the wheel. For the job illustrated here, identical or different radii can be trued on each corner of the wheel, covering a range of ¾", 1" and 1½" radii.

Diameters and radii of railroad car axle ground on the CINCINNATI FILMATIC illustrated on the adjoining page. One of the loading cradles is shown to advantage in this illustration.





New CINCINNATI FILMATIC 16" x 36" Plain Grinding Machine. Also built in 14" size. Both 14" and 16" machines are built in 36", 48", 72", 96", 120", 144" and 168" lengths.

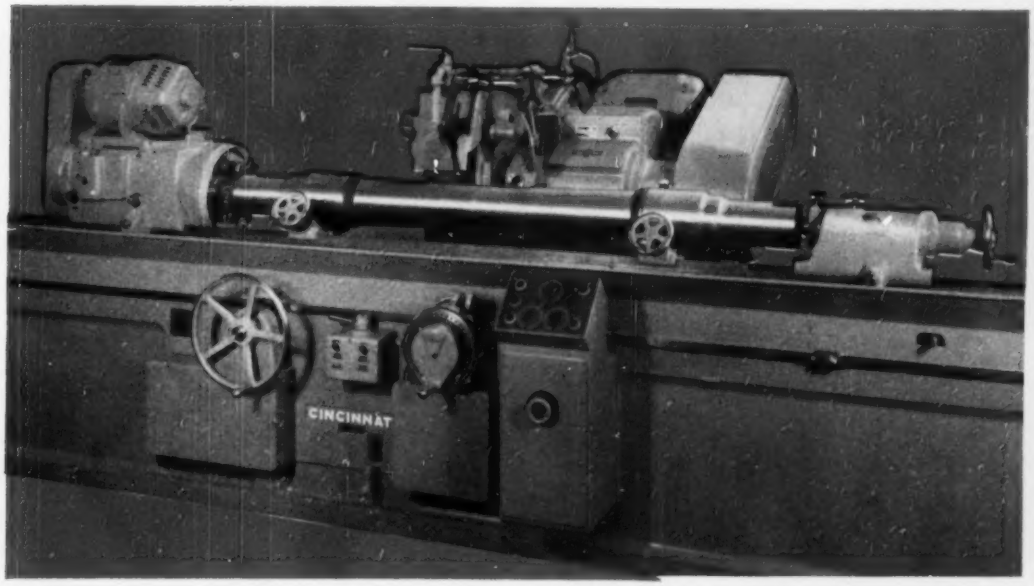
CINCINNATI GRINDERS

CENTER TYPE GRINDING MACHINES

Grinders

to Accurate Size

Long heavy work and several precision ground diameters with accurate sweeping radii are hard taskmasters for center type grinders. When these factors are combined in one part, such as the car wheel axle illustrated, extra good performance is required of the machine. CINCINNATI FILMATIC 14" and 16" Plain Grinders offer this extra value of performance, for the diameters and radii of the work are precision ground in one setting. ¶ FILMATIC Grinding Wheel Spindle Bearings, well-proportioned castings for the principal units, and electronically controlled table traverse with automatic pressure way lubrication, contribute largely to the machine's dependable performance. Another feature—hydraulic profile wheel truing device—accurately rounds the corners of the wheels, one side or both sides, identical or different radii. This truing device accommodates several cams, corresponding to the radius desired for various sizes of axles. Two loading devices complete the equipment which makes CINCINNATI FILMATIC 14" and 16" Plain Grinders the most dependable and lowest cost grinders for work of this type. Of course, these machines are not limited to grinding axles; they handle plain precision grinding operations on any medium- to large-sized part. For more information write for new catalog No. G-594. Brief data in Sweet's.

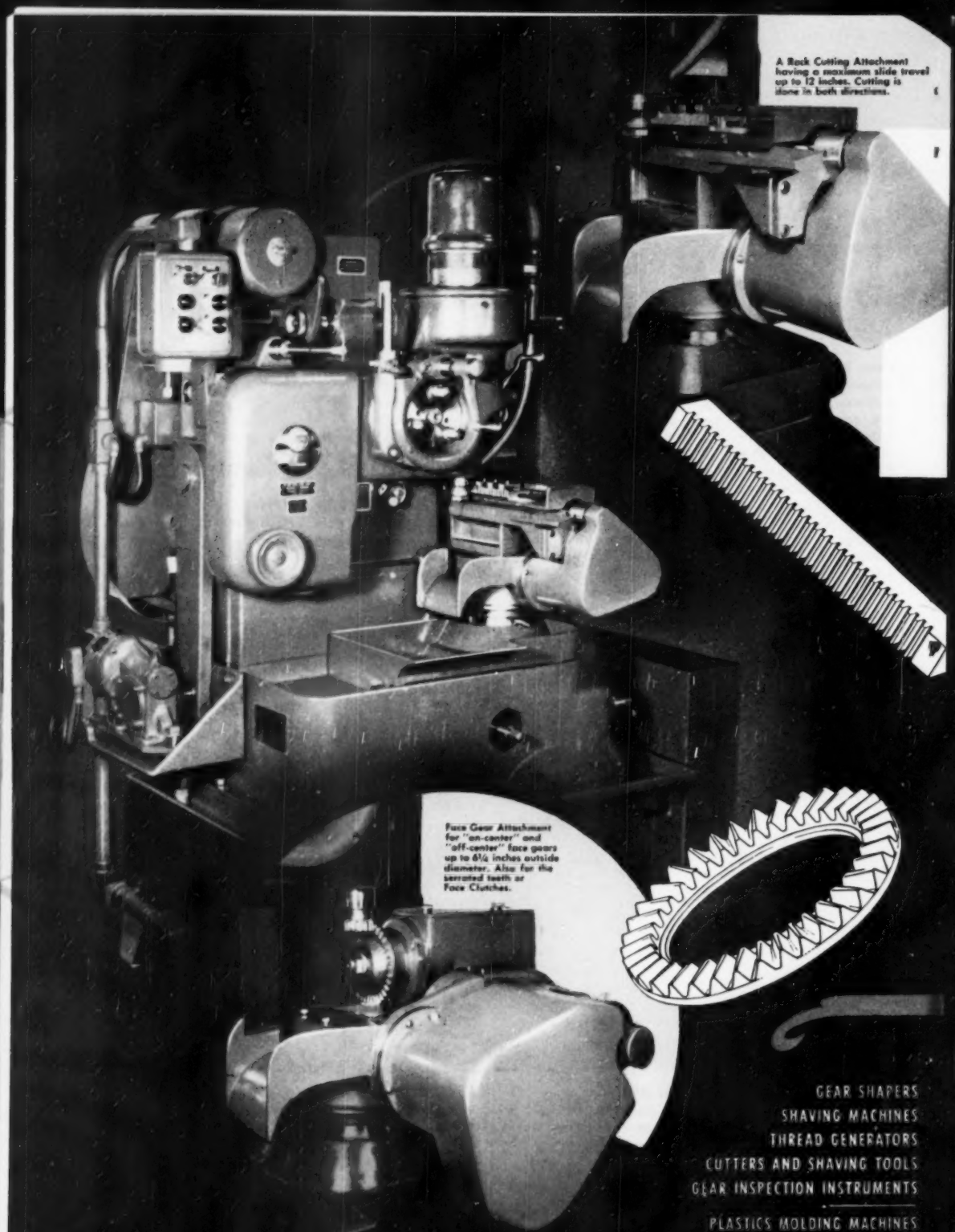


CINCINNATI FILMATIC 16" x 120" Plain Grinding Machine with profile wheel truing equipment and loading cradles to facilitate grinding operations on railroad car wheel axles.

INCORPORATED CINCINNATI 9, OHIO, U. S. A.

CINCINNATI

• CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES • MICRO-CENTRIC GRINDING MACHINES


A Rack Cutting Attachment having a maximum slide travel up to 12 inches. Cutting is done in both directions.
Face Gear Attachment for "on-center" and "off-center" face gears up to 6¼ inches outside diameter. Also for the serrated teeth of Face Clutches.

GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

Things that can always be done best on the

7-TYPE FELLOWS GEAR SHAPERS*

Gears, of course... internal and external, spur or helical, shoulder gears, cluster gears, segment gears, variable radius gears, etc., in all sizes up to the 7-inch capacity of the machines. Cams, ratchets, sprocket teeth, splines, special shapes... for all such and more, these High-Speed Gear Shapers are a first choice wherever large numbers of parts are to be cut.

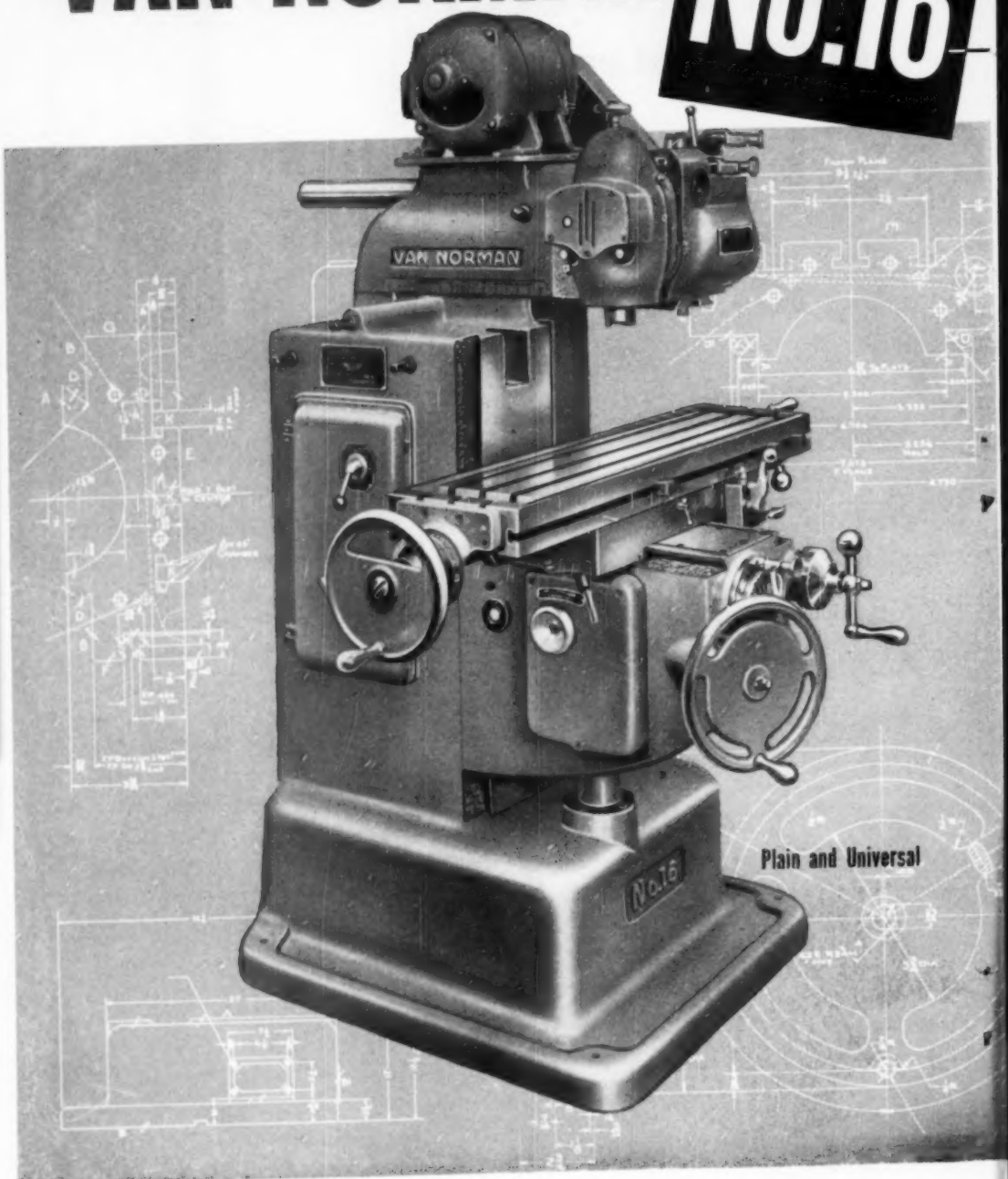
Illustrated here are two of many Attachments and Devices by which these machines can be most satisfactorily adapted to special work—at a saving in investment over a single-purpose machine. For data on the 7-series Gear Shapers, and an INFORMATIVE NEW BULLETIN on Special Attachments, write or phone the nearest Fellows Office.

*7-Type 1½-in. maximum cutter stroke.
7A-Type 2 in. maximum stroke and heavier duty.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont.
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 2206 Empire State Bldg., New York 1.

VAN NORMAN No. 16



Plain and Universal

RAM TYPE MILLER

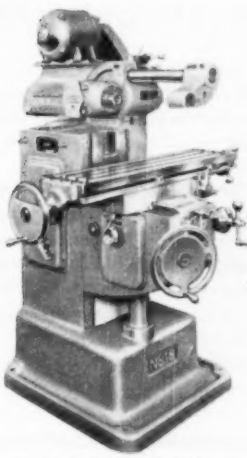
Gives You Increased Work Range... Saves Time...Reduces Costs

Among the outstanding features of this miller are the adjustable swivel cutterhead and movable ram. The combined adjustments of cutterhead and ram movement permit conventional horizontal, vertical as well as angular milling on one machine. Because most jobs can be carried through to completion without change in set-ups, the savings in set-up time alone are substantial enough to quickly pay for this miller. Not only does the No. 16 reduce work reset-ups but it also eliminates idle machine and operator time by as much as 50% since there is no waiting for single purpose machines . . . no moving of work from one type of miller to another. With the Van Norman Ram Type Miller, most non-productive time is eliminated as the operator usually moves the adjustable cutterhead instead of the work-piece.

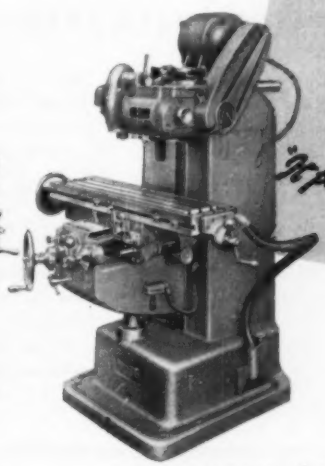
Check These Van Norman Additional Features — Built-in single lever operating control. . . movable ram scale . . . spindle speeds up to 2000 RPM . . . wide feed range . . . increased work range . . . easy-to-read dials . . . large hand wheels . . . hardened alloy-steel gears . . . heavy, internally ribbed column and base . . . compact, rigid, powerful . . . smooth and accurate performance.

Investigate the Van Norman No. 16 Miller, today. Write for bulletin.

Van Norman COMPANY
Springfield 7, Massachusetts
"It pays to Van Norman it"



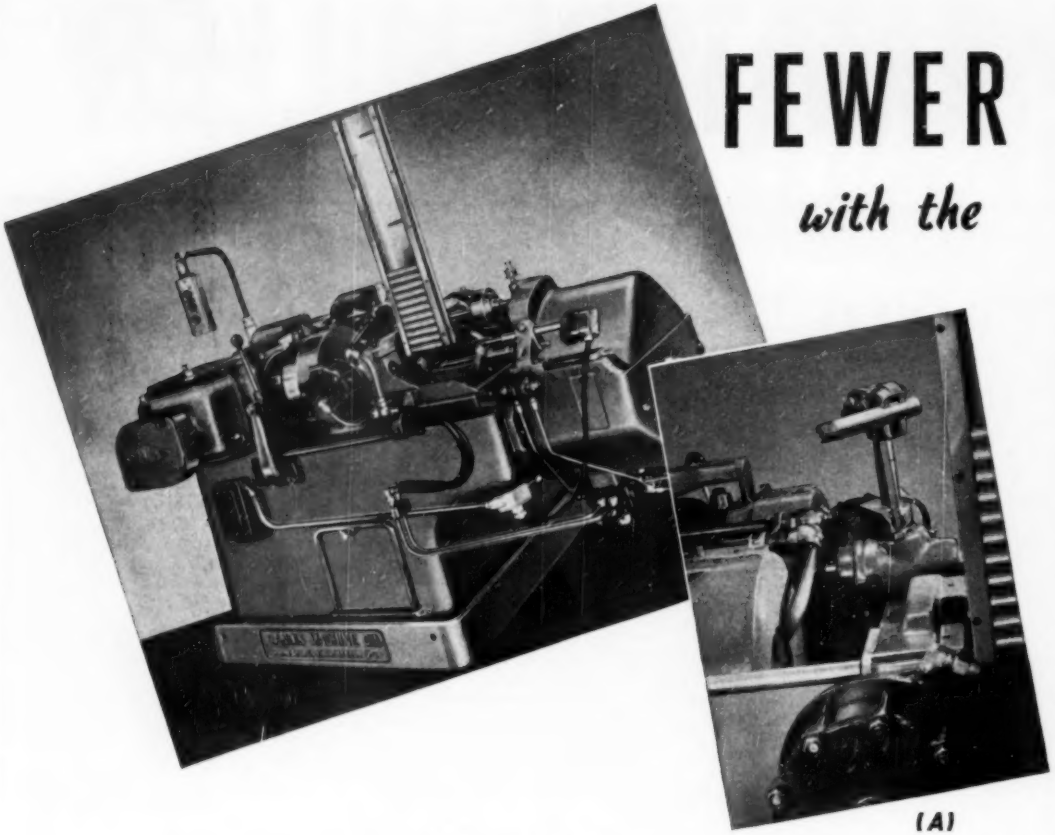
No. 16 Miller with adjustable cutterhead in horizontal position.



Adjustable cutterhead in vertical milling position.

FEWER

with the



(A)

• NEW TRANSFER MECHANISM ALLOWS LONGER

The operation cycle of the Landis Automatic Nipple Machine is completely automatic. During operation, the operator is only required to give the machine visual attention and keep the magazine on the left-hand carriage filled with nipple blanks.

The nipple blanks are released automatically from the magazine by the forward movement of the carriage. After being pushed into position in the grips, they are held by the closing of the air-operated vise. The left-hand carriage advances rapidly to the thread-starting position, and then assumes a feed rate of travel equal to the lead of the thread being cut. An accurately-machined cam controls the entire carriage movement.

After the thread has been cut, and the reaming and chamfering operations simultaneously completed on one end of the nipple blank, the die head and vise open automatically and the carriage returns to loading position. The semi-finished nipple is left in position on the work-rest bar for transfer to the right-hand carriage. Mechanical fingers pick up the semi-finished

LANDIS MACHINE

WORK STOPPAGES—

Improved LANDIS *Automatic Nipple Machine*

CONTINUOUS PRODUCTION

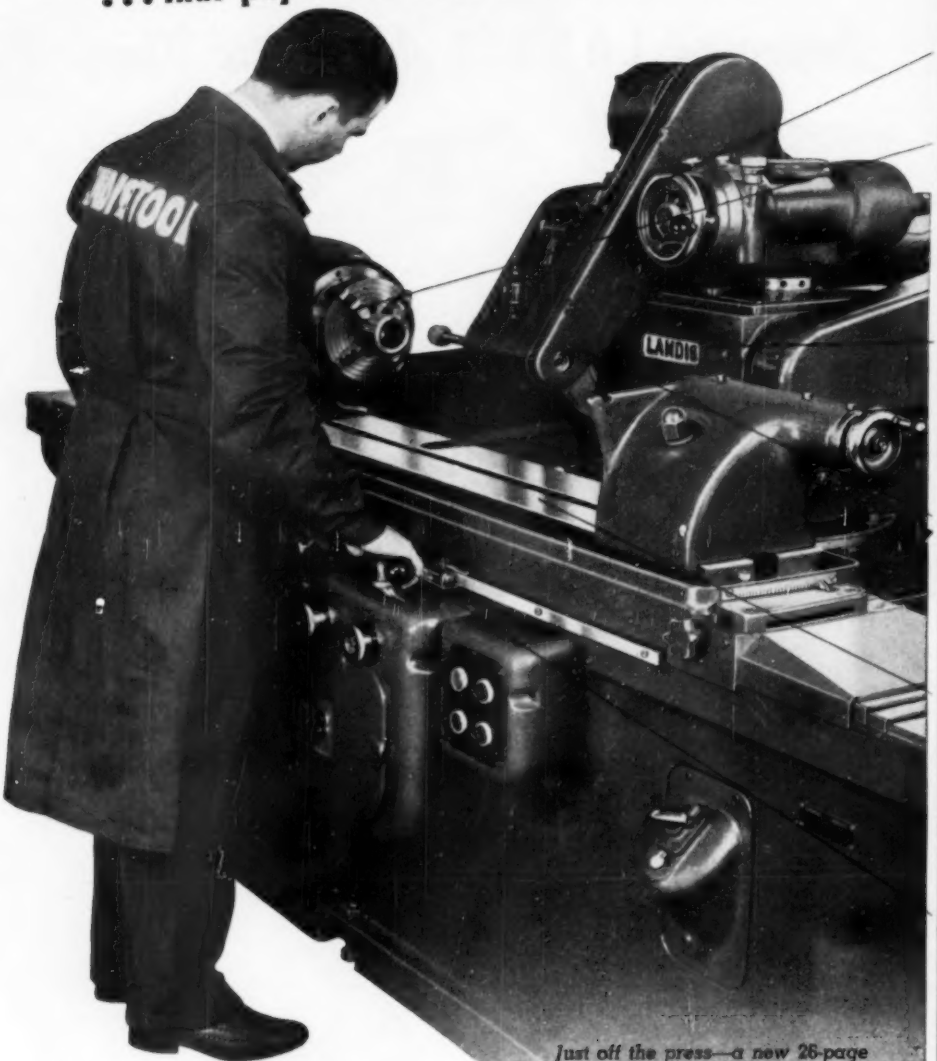
nipple (*A*), turn it end-for-end (*B* & *C*), and place it in position on the work-rest bar of the right-hand carriage (*D*). The semi-finished nipple is pushed into position and gripped for the threading, reaming, and chamfering operations on the unfinished end (*E*). After completion of the second operation, the finished nipple is automatically ejected. Simultaneous with the operations on the right-hand carriage, a second blank is beginning the operation cycle on the left-hand carriage. For further information, write for Insert to Bulletin No. D-84.

COMPANY

WAYNESBORO
PENNA · U. S. A.

6 design features of LANDIS TOOL

...that pay off in BETTER PERFORMANCE



Just off the press—a new 28-page catalog describing in detail the LANDIS TOOL 12" Type CH Universal Grinder. Write for your copy today.

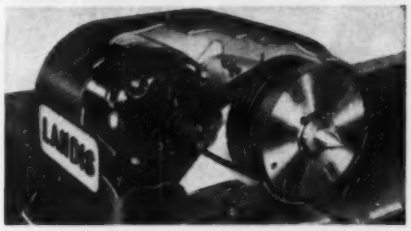
LANDIS TOOL

Precision Grinders

Hydraulic Universal Grinders

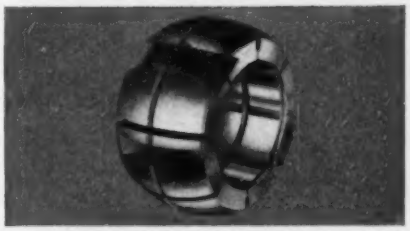
1 EYE-LEVEL WHEEL FEED

Easy to read—easy to see. Operator feeds the wheel and watches grinding action without turning his head. Less fatigue.



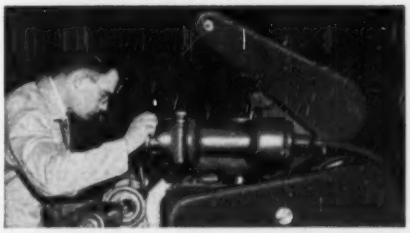
2 VARIABLE SPEED HEADSTOCK

Now you can hit the right work speed on every job for maximum production and quality. Choice of infinite number of speeds within range of machine. Only two revolving parts; the motor spindle and headstock face plate make a simple, compact mechanism.



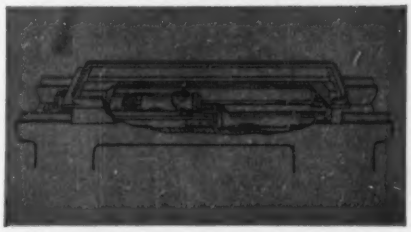
3 MICROSPHERE WHEEL SPINDLE BEARINGS

Close clearance between spindle and bearing obtained with adjustable Microsphere bearings. Wheel spindle enlarged in diameter between bearings to minimize deflection while grinding. Results in accurate work and quick spark out.



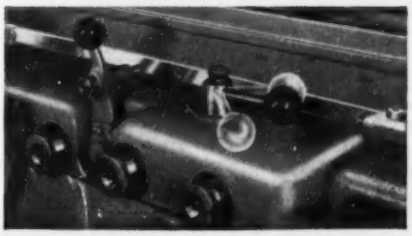
4 SWINGING INTERNAL FIXTURE

With a quick, simple change you can change from external cylindrical grinding to internal grinding. Rigid bracket with belt guarded and in tension at all times.



5 HYDRAULIC OPERATION

LANDIS TOOL hydraulic operation of table traverse and wheel feed gives the smooth power and "velvet touch" that produces fine finishes. Adjustable traverse rate, tarry at reversal and wheel feed, permits quick setup.



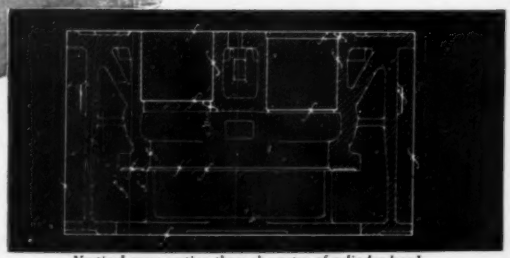
6 RAPID HYDRAULIC WHEEL POSITIONING

Wheel positioning by simple lever movement gives big savings where setups are frequent . . . cuts wheel positioning time 50% or more . . . reduces operator fatigue. (Extra equipment)

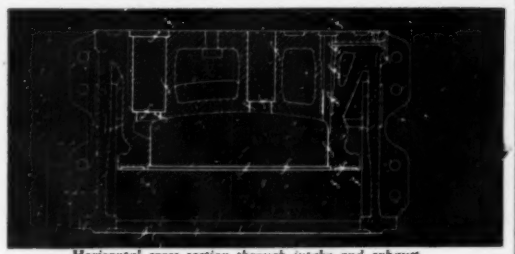
LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

5 TON CYLINDER HEAD

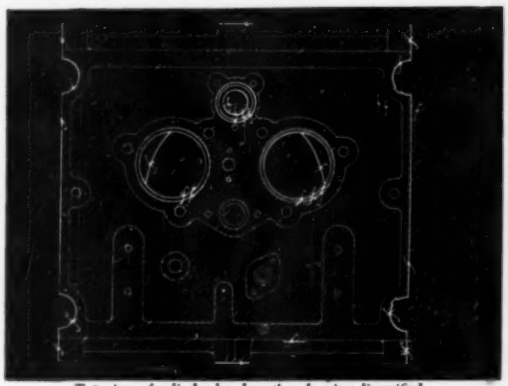
G. & L. Horizontal Boring Machine Proves Only Practical and Economical Method to Use for Boring, Drilling and Milling Huge 6 Faced Casting...



Vertical cross section through center of cylinder head with machining indicated.



Horizontal cross section through intake and exhaust ports with machining indicated.



Top view of cylinder head casting showing diversified character of machining operations.

● Here is a 10,000-lb. cast-iron Cylinder Head for a Diesel engine, requiring diversified machining operations on each of six faces. All dimensions must be held to close tolerances with tapped holes, bores and machined surfaces in correct alignment to meet assembly requirements.

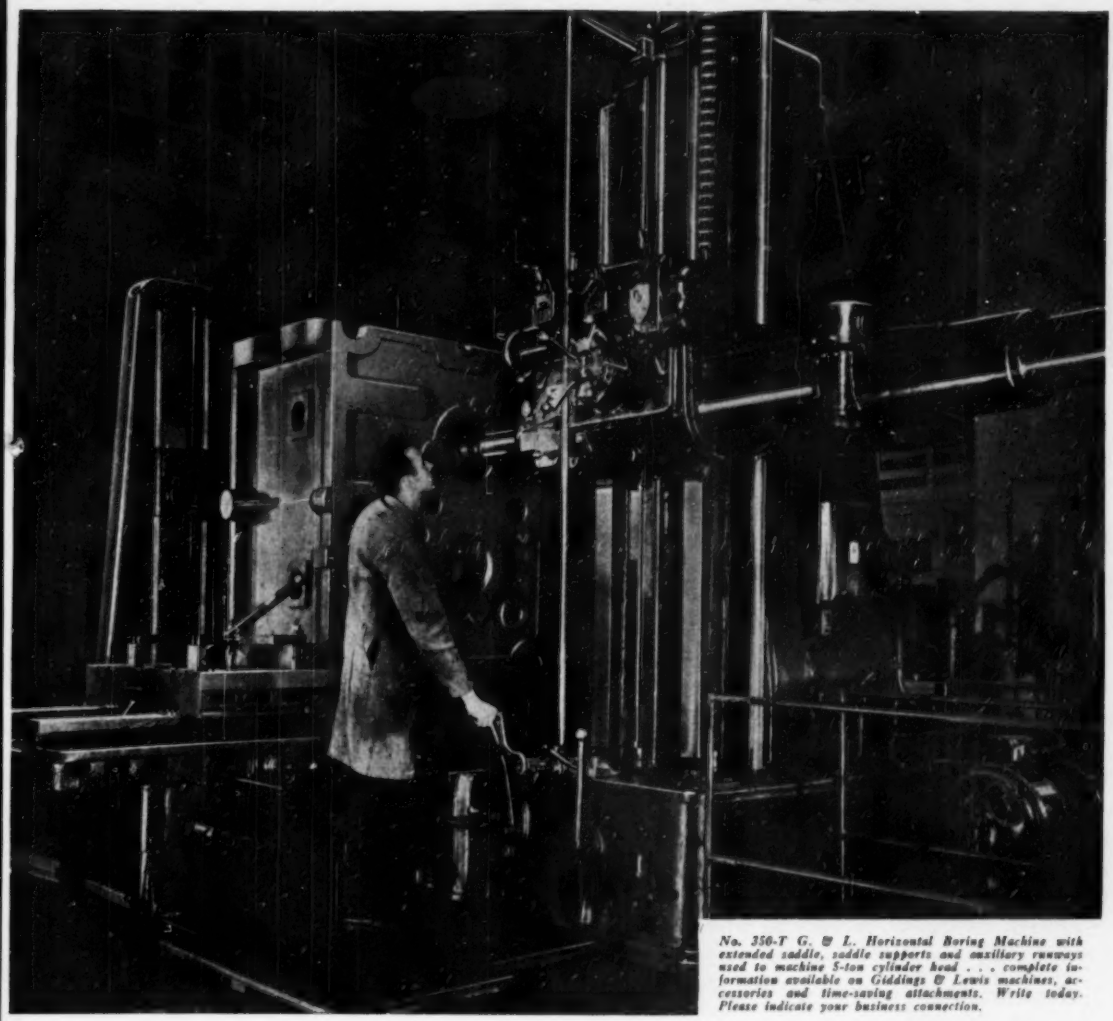
The manufacturer states that "the only practical method of doing this job is to machine it completely on the G. & L. Horizontal Boring Machine." He claims that "due to the pressure of production this cylinder head must, at times, be routed over several machines to relieve the load on the Horizontal, but nevertheless, the best and only economical method for us is to do all the work on our G. & L."

The flexibility, capacity, working range, simplicity of setting the work, accuracy, convenience of scales and verniers, micrometer dials, etc., all contribute in making the G. & L. Horizontal Boring Machine one of the most practical and economical machines in shops with large complex work.

In your own plant you may be producing work on more than one machine which can be handled faster and at less cost on a Giddings & Lewis Horizontal Boring, Drilling and Milling Machine. Our engineers will gladly assist you in analyzing and solving difficult machining problems.

GIDDINGS & LEWIS
FOND DU LAC

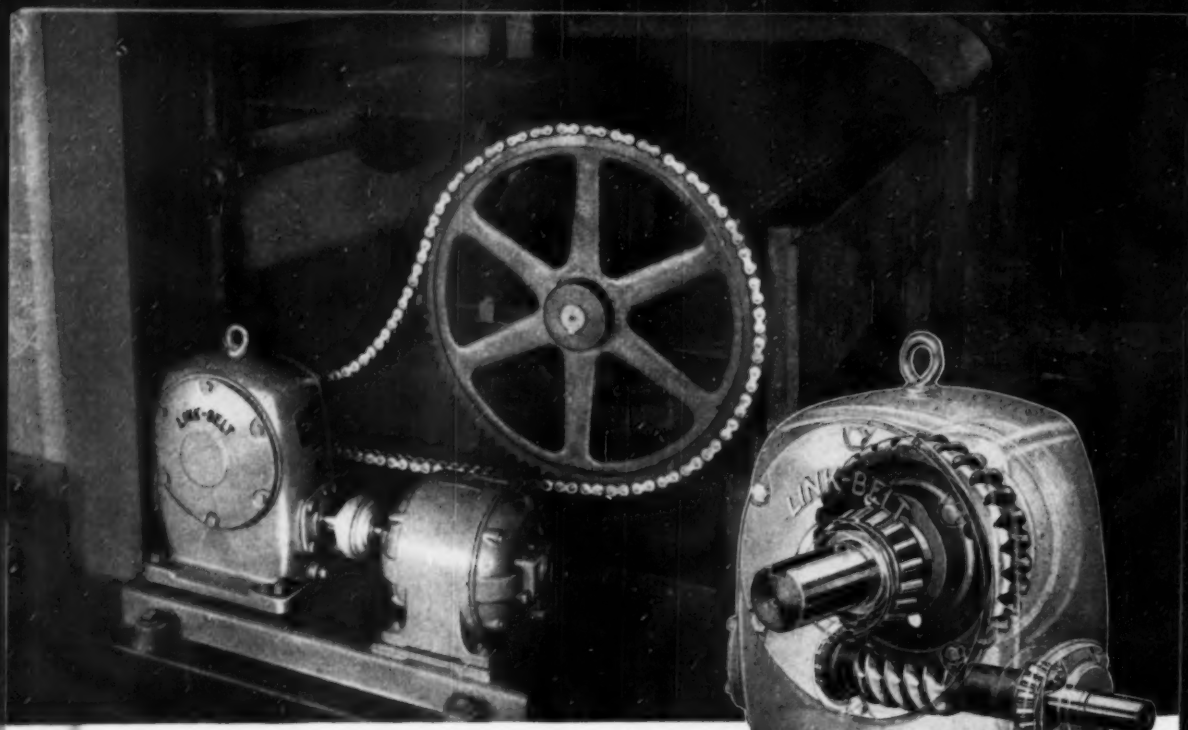
SET UP AND MACHINED IN 40 HOURS



No. 350-T G. & L. Horizontal Boring Machine with extended saddle, saddle supports and auxiliary runways used to machine 5-ton cylinder head . . . complete information available on Giddings & Lewis machines, accessories and time-saving attachments. Write today. Please indicate your business connection.

MACHINE TOOL COMPANY

WISCONSIN U. S. A.



If the problem involves Speed Reduction

LINK-BELT experience may help you..

Any application for a speed reducer can be filled with a Link-Belt enclosed gear drive—and satisfactory results assured. Link-Belt manufactures all standard types, and Link-Belt power transmission specialists can offer reliable recommendations as to size and type to suit your precise need.

Herringbone Gear Drives for large reductions in limited space—high shock resistance—single, double or triple reductions. Send for Book No. 1819; Worm Gear Drives for high ratio reductions, horizontal or vertical drive shafts. Data in Book No. 1824; Link-Belt Gearmotors, self-contained power unit. Book No. 1815-A.

In respect to any drive in the broad Link-Belt line of power transmission machinery, Link-Belt engineering advice is completely unbiased.

TYPES OF LINK-BELT POWER TRANSMISSION MACHINERY

Precision Steel Roller Chain	P.I.V. Variable Drives
Silverstreak Silent Chain	Fluid Drives
Steel and Malleable Chain	V-Belt Drives
Worm Gear Drives	Ball Bearings
Herringbone Gear Drives	Roller Bearings
Helical Gear Drives	Babbitted Bearings
Gearmotors	Couplings, Clutches, Collars, etc.

LINK-BELT COMPANY Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

11,738

LINK-BELT

Power Transmission Machinery

"THE COMPLETE LINE"

Why does he Count his chickens ...before they are "vaxed"?

"Now we've seen everything!" Every time we say that, we can count on it that someone will figure out a new way to use counters. There was the drink-dispenser, the Iron Chinaman, the map-making machine, the fishing reel, the ship's sextant, the exercise table, the bowling-pin setter and countless others.

Then came the egg-grader. So it was only a matter of time 'til another inventive mind combined a counter with a vaccinating device, to keep count of his birds as he needled them!

But why all the figuring on how to use counters? Because Veeder-Root Counters add a new usefulness to any product into which they are built as standard equipment . . . a new sales stimulant, a new profit-producer. Now, let's get together and see what counter-use we can figure out for *you!*

SMALL RESET COUNTER

counts strokes, revolutions, pieces, operations, etc. Easily built into any type of product. Write for spec-sheet on this counter, and for Condensed Catalog.

VEEDER ROOT INC., HARTFORD 2, CONN.

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Rd., Dundee, Scotland.

Veeder-Root COUNTERS

Parts to Ultra-fine Finishes
Parts to Ultra-close Dimensions

Type 16FC Lapping Machine—The vertical lapping machine that produces optically flat surfaces and thickness *tolerances in millionths.* Catalog No. 212-2 for details.

SEAL-O-LAP Single Surface Lapping Machine—The machine that produces *superior seal surfaces* on seals of metallic or non-metallic composition. Catalog 215-1 for details.

No. 12 Simplex Surface Finishing Machine—The pneumatically operated machine that produces *low micro-inch readings* on diameters from ½" to 2½". Catalog 217-1 for details.

Abrasives | Grinders | Wheels | Bonding and Lapping Machines | Refractories | Porous Materials | Resilient Floors | Norbide Products | Labeling Machines

Need Not Be More Costly

That's Being Proved in Plant after Plant with NORTON LAPPERS

TO meet today's keenly competitive conditions designers are specifying closer and closer dimensional accuracies and finer and finer finishes. And to meet these requirements ***economically*** there's a varied line of Norton Lapping Machines—machines that range from the small 16 FC to the large, high production HYPROLAP*—machines for flat work and for cylindrical work, including crankshafts.

The ability of these Norton machines to produce uniform, ultra-fine parts makes it possible to reduce costly selective assembly and multiple inventories.

If you are looking for closer dimensional tolerances and lower micro-inch finishes at attractive cost levels it will pay you to get in touch with Norton lapping engineers.

*T. M. REG. U. S. PAT. OFF.

M-583

HYPROLAP High Production Lapping Machine—The fast cutting, bonded abrasive lap machine which finishes a ***score or more work pieces simultaneously*** and produces outstanding accuracy and quality of finish. Catalog 852-6 for details.

NORTON COMPANY WORCESTER 6, MASS. New York · Chicago · Detroit · Cleveland · Houston · Distributors in All Principal Cities

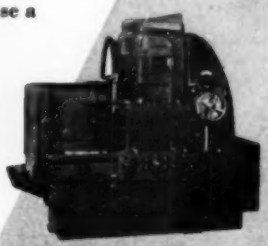
Housing Shortage? ... Put them on a Blanchard

A manufacturer was getting 1 to 2 gear case housings (right) per hour by a former method — now a Blanchard No. 18 is grinding the joint surfaces of 8 to 9 pieces per hour. Up to 3/16″ of cast iron is removed per piece. 3 pieces are produced in a single operation to required tolerance.

Thirty transmission housings per hour (left) are finish ground on a Blanchard No. 11, removing .010″ from previously machined castings. They are held flat to .001″ and to ±.002″ for size. A special Blanchard-designed holding fixture, actuated by a single wrench motion, helps produce these housings in such short time.

There will be no housing shortage in your plant if you use a Blanchard Surface Grinder—may we grind your samples to prove our point?

Send for your free copies of "Work Done on the Blanchard," third edition, and "Art of Blanchard Surface Grinding."



NO. 18 BLANCHARD SURFACE GRINDER

PUT IT ON THE BLANCHARD

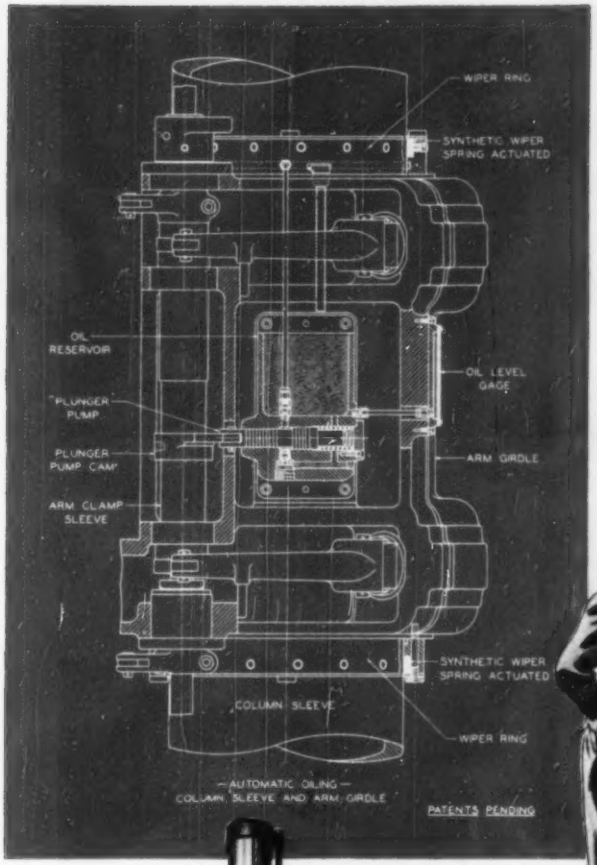
THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Just a memory now

Column Scoring a thing of the past...

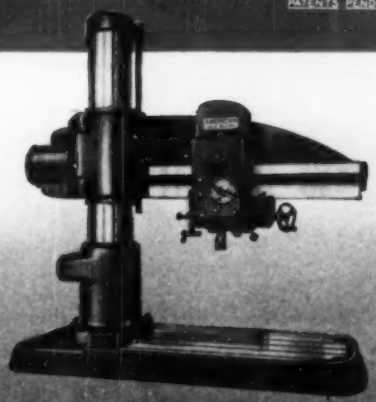
We've done something about it—

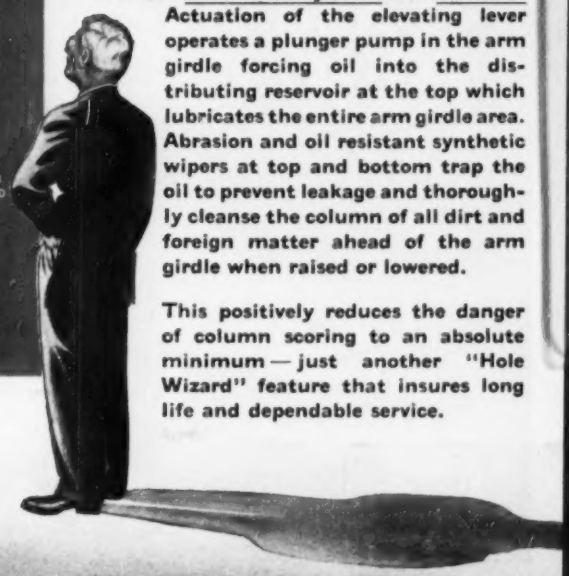


On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed.

Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.



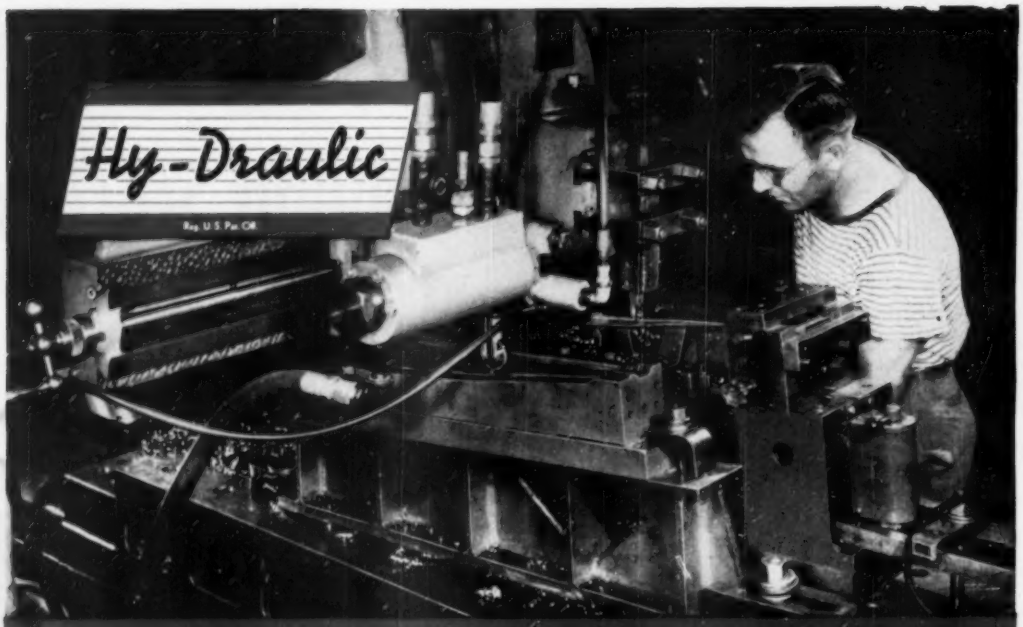


Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

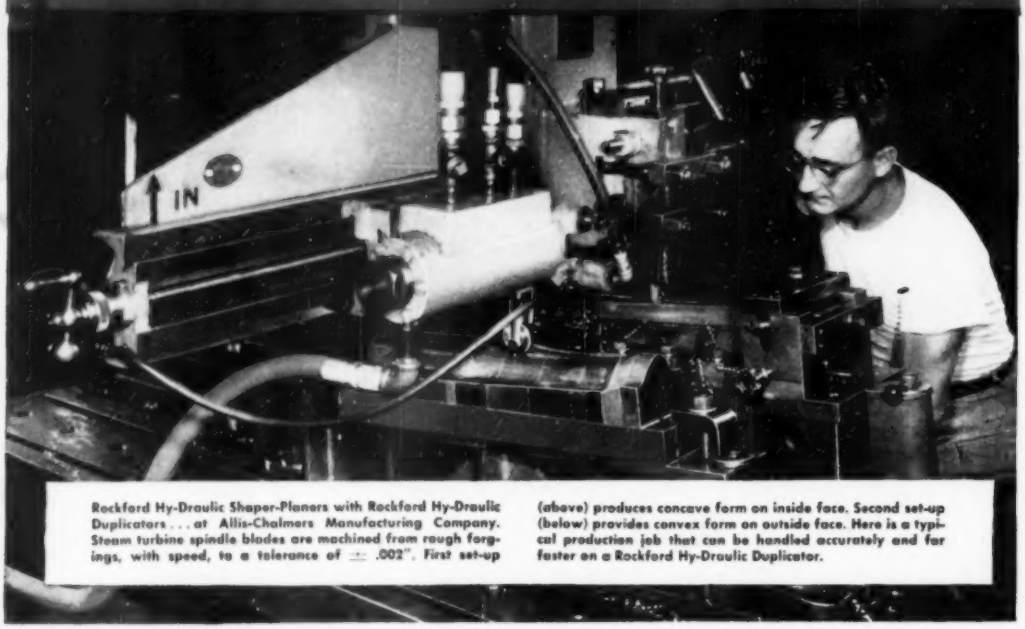
THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



Here are the machines



Rockford Hy-Draulic Shaper-Planers with Rockford Hy-Draulic Duplicators . . . at Allis-Chalmers Manufacturing Company. Steam turbine spindle blades are machined from rough forgings, with speed, to a tolerance of ± .002". First set-up (above) produces concave form on inside face. Second set-up (below) provides convex form on outside face. Here is a typical production job that can be handled accurately and far faster on a Rockford Hy-Draulic Duplicator.

DURING RECENT MONTHS the tremendous economies made possible by the Rockford Hy-Draulic Duplicator have been proved over and over again. In die or mold making, even though a part may be made only once, the duplicator has proved itself practical by the time and money it saves. A pattern in plaster or other easily worked material can be used as the guide for machining the part.

In production work, the initial pattern can be made of wood or plaster . . . and be used to machine the template or form to be used in production machining.

While this method of machining may be well known as a theory, the Rockford Hy-Draulic Duplicator installed on Rockford Hy-Draulic machines has definitely made the method practical. Basically the reason is, that with Rockford equipment such work is machined as quickly as any type of shaper or planer work . . . with accuracy to the thousandth of an inch. The fact that the duplicating unit is hydraulic in design, means that movement established by the tracer or follower is directly imparted to the tool head. No secondary mechanical motions exist to reduce speed or cause inaccuracies.

CHECK THE FACTS . . . let a Rockford sales engineer give you complete information on Rockford Hy-Draulic 36" Openside Shapers, Planers, or Shaper-Planers equipped with Rockford Hy-Draulic Duplicating attachment.

and the facts

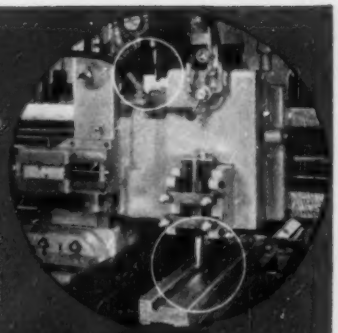
CHECK THESE ROCKFORD HY-DRAULIC DUPLICATOR ADVANTAGES:

- Hydraulically actuated . . . provides speed and accuracy. Built by Rockford Machine Tool Co. . . . builder of Hy-Draulic machine tools since 1929.
- Saves tremendous time and cost. One typical job on one part alone saved almost four days of hand scraping for two men.
- Stylus or tracer is in contact with master only on cutting stroke. On return stroke both tracer and tool are lifted. This saves wear on master, tracer, and tool . . . and permits use of carbide tools. In addition, return stroke can be set for fast speed . . . to save in overall machining time.
- Attaches to any size Rockford Hy-Draulic 36" Openside Shaper, Planer, or Shaper-Planer.
- Duplicator operates at any cutting speed . . . the same speed you would use in machining without the duplicator attached.
- Stylus or tracer pressure is extremely light.
- Automatic tool lift and head lock if power fails.
- Tool head hydraulically counter-balanced.
- Feed movement of duplicator may be set to operate at either end of stroke which is advantageous on some duplicating work.

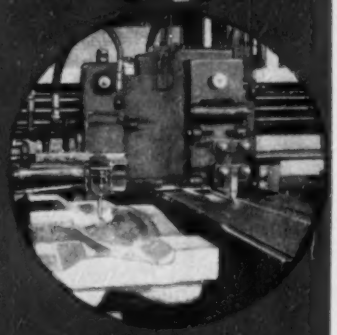
Write for complete information to:

ROCKFORD MACHINE TOOL CO.
2533 Kishwaukee Street • Rockford, Illinois

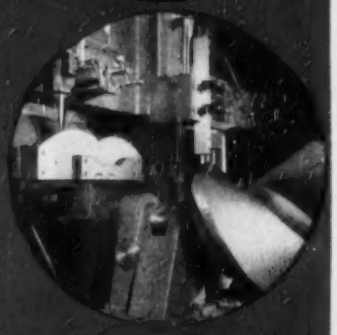
FOUR TYPICAL JOBS AND FOUR TYPES OF SET-UP



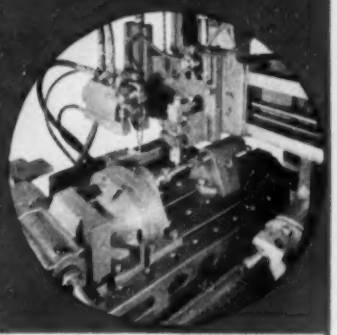
work with the same cross section along the line of machining . . . with stationary template mounted on rail.



work with form changing constantly along line of machining . . . with traveling template mounted on planer table.



work where tool travels at fixed level during cutting stroke with helix generated by table fixture . . . stationary template mounted on rail.



work where tool travels over changing level during cutting stroke with helix generated by table fixture . . . traveling template mounted on planer table.

FOR FAST • ACCURATE • LOW COST • CONTOUR MACHINING

ROCKFORD Hy-Draulic DUPLICATOR

4902

TAPPING WITH WINTER NUT TAPS

One of the most punishing of tapping operations is in the production of the wide variety of nuts required in our modern industrial set-up. Winter Nut Taps of the straight shank, bent shank, and nib varieties are designed to meet this need. They are the result of long experience in design, heat treatment, and field operation. Winter service engineers are available to help you deliver the maximum production through the correct use of Winter Nut Taps. Winter makes all common types of taps and dies as well as taps for special applications.

ALWAYS AT YOUR SERVICE

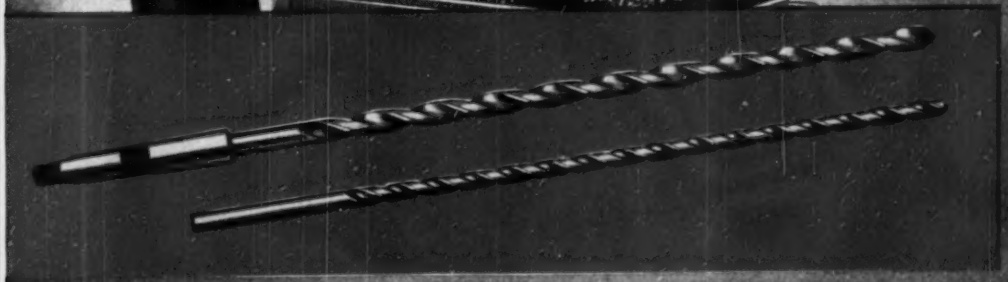
YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

WINTER

WINTER BROTHERS COMPANY - Division of the National Twist Drill and Tool Company
Rochester, Michigan, U. S. A. Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

DEEP HOLE DRILLING WITH NATIONAL DRILLS

● Drilling of deep holes (more than 4 drill diameters) involves special drill designs, special heat treatment, and special operating techniques. These are available from National, together with the services of National engineers and metallurgists. Their experience and know-how are available to help you on this or any other knotty metal cutting problem. National manufactures twist drills, reamers, milling cutters, end mills, counterbores, hobs, and special tools.



"CALL YOUR DISTRIBUTOR"—It is NATIONAL'S firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs—including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL & TOOL ROCHESTER MICH. U.S.A.

National

NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U.S.A.

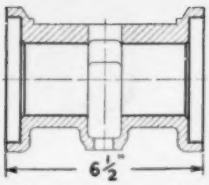
Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

Cut your Tool Costs with
P & W
LONG-LIFE
END MILLS
Every type, every size in a complete range of sizes quickly available from stock at Factory and Branch Offices listed below.
The special surface treatment given P&W End Mills results in maximum wear life.
Pratt & Whitney
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT
It Pays to Buy
END MILLS
on a Performance Basis
Branch Offices and Stock

POTTER & JOHNSTON TOOLING

Exclusive POTTER & JOHNSTON FEATURES

ACCOUNT FOR *Profitable* MACHINING SETUP

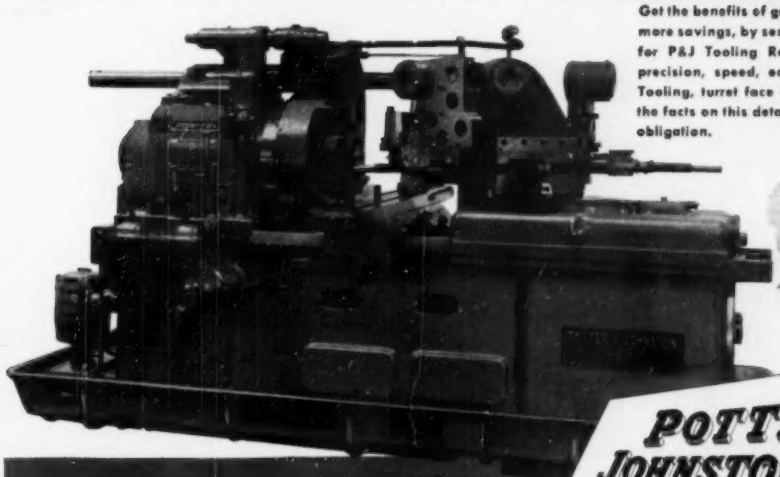


P&J engineered the ingenious tooling for this cast iron Bearing Housing — designed it to complete the rough and finish machining at both ends, a total of 18 operations, *in one holding.* Eight operations are performed at one end . . . the work is indexed 180° . . . eight operations are performed at the opposite end . . . the full length of the I. D. is then line bored and line reamed. Floor-to-floor time at 85% efficiency is 6 minutes, a feat made possible by P&J experience-engineered Tooling — including the specially designed indexing type work holding fixture — which accounts for combining cuts, avoiding secondary operations, and keeping machining times down to an absolute minimum. Additional savings are realized from the accumulated economies of increased tool life, and from divided labor costs — P&J Automatics are *fully* automatic, therefore one operator can easily run 3 machines on this class of work.

—including this P&J-designed INDEXING FIXTURE

eliminates secondary operations on the POTTER & JOHNSTON 5DELX AUTOMATIC

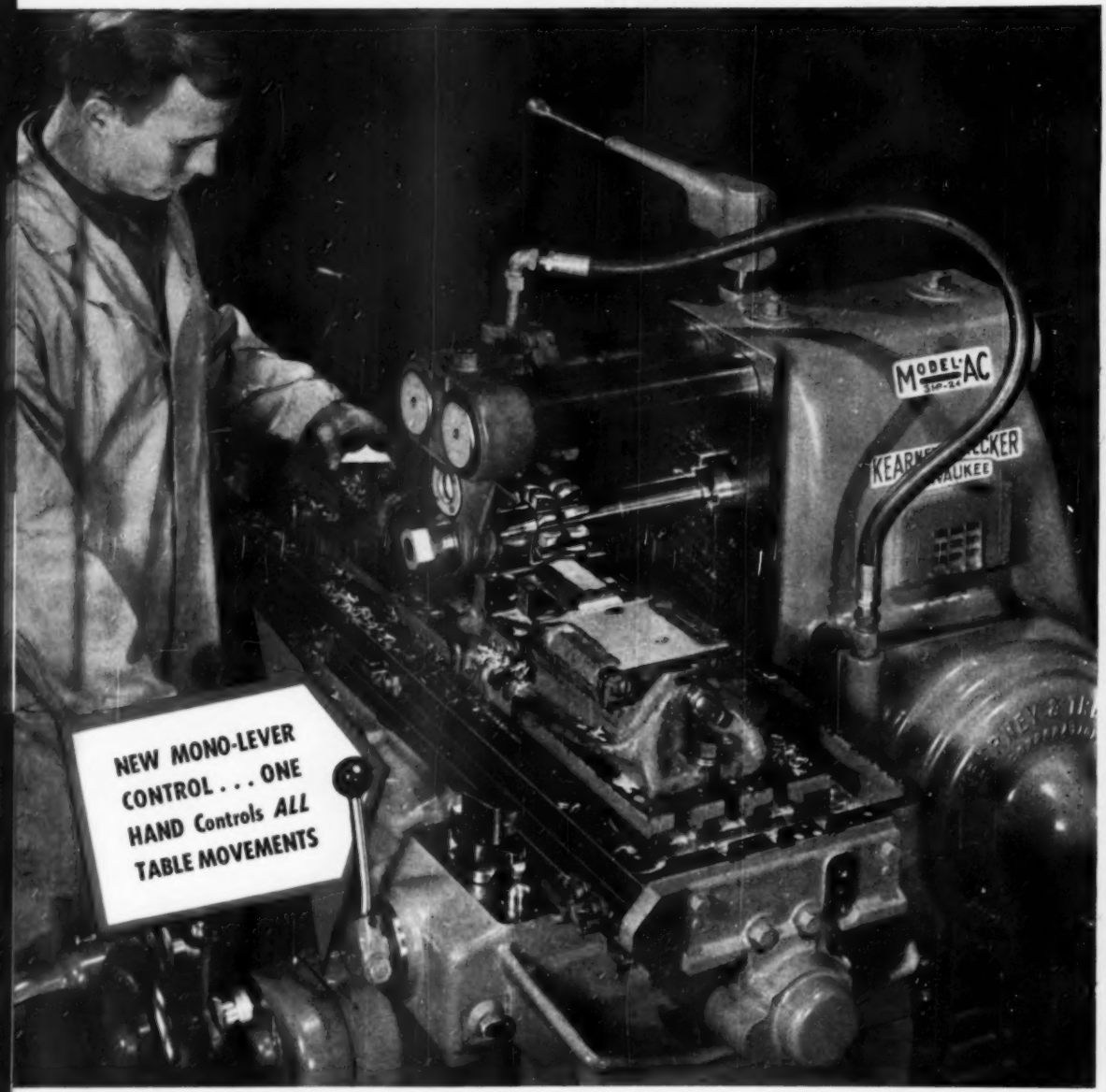
Get the benefits of greater accuracy, better work, more savings, by sending a sample of your work for P&J Tooling Recommendations based on precision, speed, economy. We'll engineer the Tooling, turret face by turret face, and present the facts on this detailed Estimate Sheet, without obligation.



P&J 50 YEARS' EXPERIENCE IN TOOLING FOR *Precision + Productivity + Economy*

POTTER & JOHNSTON CO.
PAWTUCKET, R. I.
subsidiary of PRATT & WHITNEY
Division Niles-Bement-Pond Company

Now in the 3hp range..FOUR NEW MACHINES FEATURING



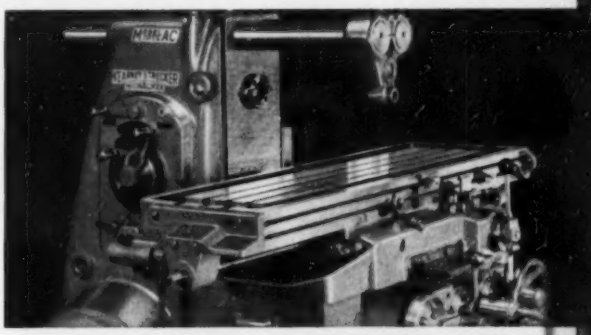
Camera study of good management at work! The job—form mill two radii on medium steel wedge plates. Fine finish required. With new Kearney & Trecker 3hp Model 24-AC machine, operator sets up automatic table cycle for reciprocal milling and easily paces production using climb and conventional milling alternately. RESULT: 28% savings in loading time, reduced scrap, more uniformity, less operator fatigue.

KNEE-TYPE MILLING MONO-LEVER CONTROL

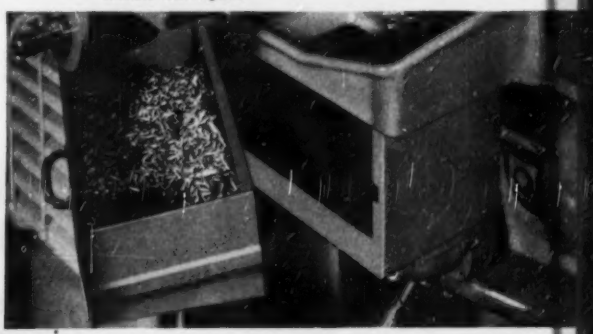
YOU asked for them — Kearney & Trecker milling machines in the 3hp range with Mono-Lever Control and Automatic Table Cycle. Here they are — your choice of two different styles, plain or vertical with either 18" or 24" table feed.

These machines offer you features never before available on machines of this size and type: 33% larger table working area plus built-in deep-well coolant troughs all around — extra large (2" dia.) precision-ground table screw with adjustable nut to eliminate backlash — drawer-type chip containers for easy chip removal — positive metered lubrication of the saddle and table ways and table feed mechanism—six-way power rapid traverse — automatic spindle stop — and quick-change feed and speed selection.

Don't wait. It costs you nothing to find out today about these new machines. See how they can meet all around big or small job requirements in your shop. For detailed information call our nearest representative or write direct to Kearney & Trecker Corporation, 6784 West National Avenue, Milwaukee 14, Wisconsin.

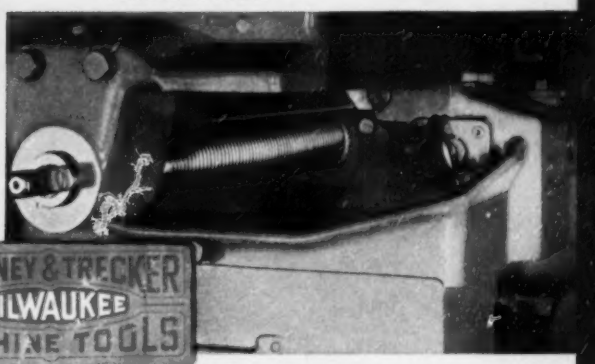


You get 33% more table working area on these new machines — 38" x 14" on Model 18-AC and 44" x 14" on Model 24-AC. This means greater adaptability to handle more jobs.



Convenient, removable drawer-type chip containers simplify chip control and "housekeeping" on the job — improve working conditions for operator—screen chips from coolant return.

New 3hp Model 24-AC plain style Kearney & Trecker milling machine featuring Mono-Lever Control and Automatic Table Cycle . . . ask about it or the vertical style equivalent today!



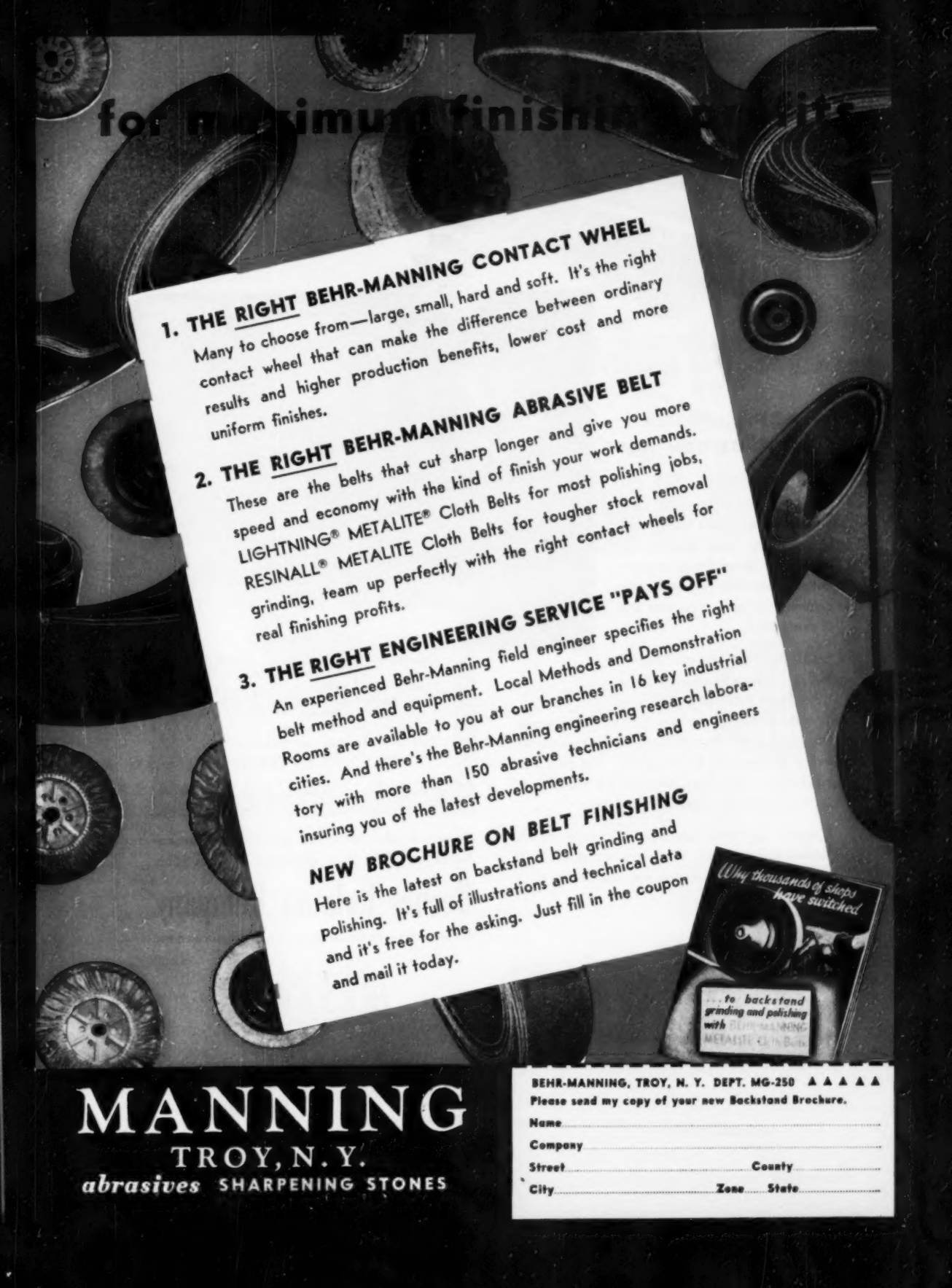
Adjustable table screw nut on precision-ground 2" diameter screw eliminates backlash—makes climb or conventional milling equally easy . . . assures uniform, accurate results.

The COM[illegible]ATION THAT CLICKS

BEHR-MANNING®

BEHR

USE NORTON®


for maximum finishing profits
1. THE RIGHT BEHR-MANNING CONTACT WHEEL
Many to choose from—large, small, hard and soft. It's the right contact wheel that can make the difference between ordinary results and higher production benefits, lower cost and more uniform finishes.
2. THE RIGHT BEHR-MANNING ABRASIVE BELT
These are the belts that cut sharp longer and give you more speed and economy with the kind of finish your work demands. LIGHTNING® METALITE® Cloth Belts for most polishing jobs, RESINALL® METALITE Cloth Belts for tougher stock removal grinding, team up perfectly with the right contact wheels for real finishing profits.
3. THE RIGHT ENGINEERING SERVICE "PAYS OFF"
An experienced Behr-Manning field engineer specifies the right belt method and equipment. Local Methods and Demonstration Rooms are available to you at our branches in 16 key industrial cities. And there's the Behr-Manning engineering research laboratory with more than 150 abrasive technicians and engineers insuring you of the latest developments.
NEW BROCHURE ON BELT FINISHING
Here is the latest on backstand belt grinding and polishing. It's full of illustrations and technical data and it's free for the asking. Just fill in the coupon and mail it today.
Why thousands of shops have switched
...to backstand grinding and polishing with
MANNING
TROY, N.Y.
abrasives SHARPENING STONES
BEHR-MANNING, TROY, N. Y. DEPT. MG-250
Please send my copy of your new Backstand Brochure.
Name
Company
Street
County
City
Zone
State

146-Tooth Chamfered Ring Gears in 29 Seconds

Using

BARBER-COLMAN SINGLE-POSITION HOBS

Hobbing these flywheel ring gears not only puts gear tooth chamfering on a production basis with other forms of gear cutting but also proves highly economical as far as tool life is concerned.

Since Barber-Colman *"Multi-thread"* Gear Chamfering Hobs have been used on this job, a consistently high rate of output has been maintained. A complete 146-tooth gear is chamfered every 29 seconds floor-to-floor. Not only has production increased, *but tool life has jumped from 30 to 160 pieces per hob sharpening.*

JOB FACTS

Operation—Chamfer one side of 146-tooth ring gear, 14" dia x ½" face, 10 pitch
Material—SAE 1050A
Hobs—Barber-Colman Chamfering Hobs, 5" dia., 3 threads
Fl-to-Fl—29 seconds per gear
Tool Life—160 pieces per sharpening
No. Sharp.—75, .005" per sharpening

Special Barber-Colman hobs, correctly designed for your job, can save many hours of production time and reduce tool costs to a minimum. Ask your Barber-Colman representative for production estimates on your jobs.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 7108 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

GET THIS FREE BOOK

A complete file of case histories on special and high production hobbing jobs. Ask for file No. 7108.

BARBER COLMAN

GISHOLT

ST CUTTING
REAS

production pointers from GISHOLT

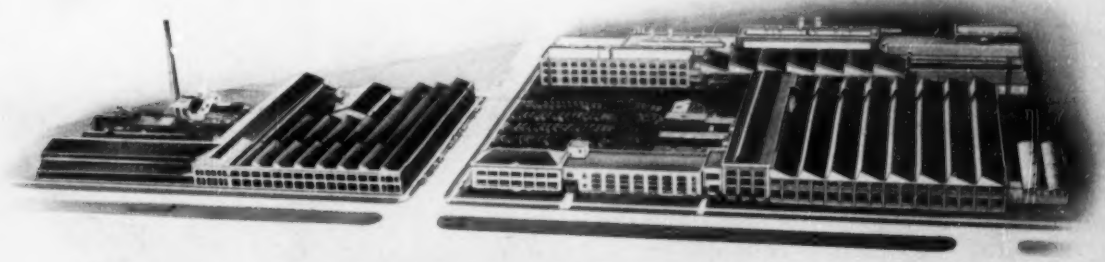
GISHOLT

A UNIQUE SERVICE IN THE MACHINE TOOL INDUSTRY

When you call upon Gisholt engineers, you obtain unbiased help on your turning problems. This is because Gisholt's broader range of equipment includes both types of manually operated turret lathes as well as three distinct types of automatic lathes. Here are the machines to answer your specific needs for production. Here, too, is the experience —without prejudice for one type of machine over another. Gisholt's compelling interest is to solve your problems in the most efficient manner.

GISHOLT MACHINE COMPANY • MADISON 10, WISCONSIN

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

TO GET MORE OF YOUR MONEY'S

FIRE EXTINGUISHER MANUFACTURER PUTS HEAT ON HIGH PRODUCTION COSTS

GISHOLT TURRET LATHES IN THE PICTURE AGAIN

Surprising what a little imagination can do to costs! Take the case of Ansul Chemical Company, prominent manufacturer of dry chemical fire extinguishers. The pressure cartridges, shown below, are inserted in their extinguishers and secured by means of a splined hexagon collar.

Formerly, two separate operations were required; machining of the neck and removal to another department for welding the collar to the cartridge. This was slow and costly production.

Ansul's production men sought a better way—and found it. Using Gisholt No. 5 Ram Type Turret Lathes, they combined machining and assembly into *one* operation.

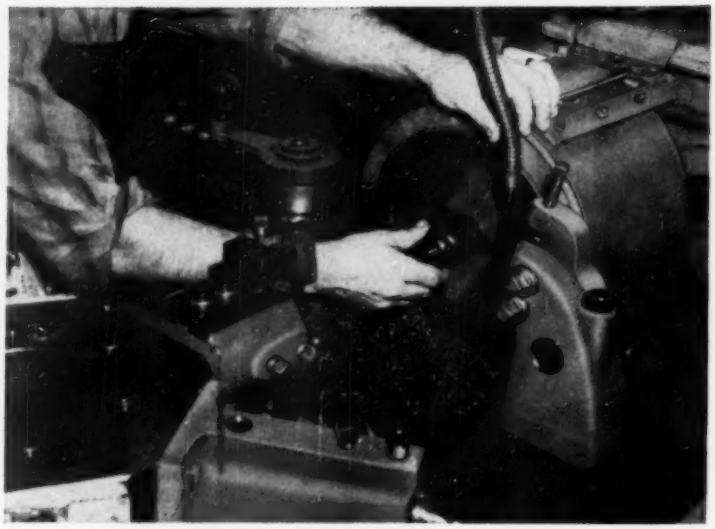
Cuts time 30%-40%

Now, the eight different steps on these gas pressure cartridges are performed in *one* chucking. These are: turn, face, bore, thread, and tap. Then, the hexagon collar is placed over the neck and the face of the cartridge is grooved to hold the collar in place. The final operation rolls the face into the collar, staking it firmly in position. The saving is 30% to 40% of the former time.

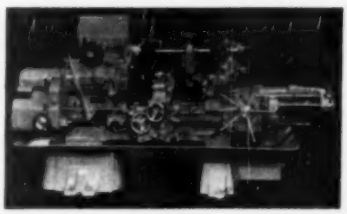
So well has this worked out, this manufacturer now has three Gisholt Turret Lathes operating exclusively on the production of gas pressure cartridges.

Perhaps, many such time and money-saving opportunities are waiting to be discovered in your own production operations. Gisholt engineers are ready to give you the best of their experience—to help you cut time and costs.

This photo shows the bottle before machining, after machining, collar in position and collar staked.



MACHINES AND ASSEMBLES IN ONE OPERATION! This close-up photo shows operator placing splined collar over neck of cartridge without stopping the spindle.



Popular "professor" of student engineers.

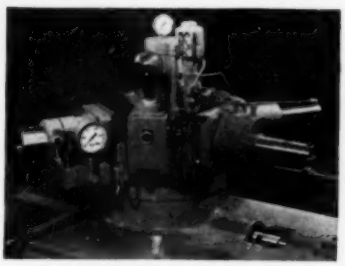
Turret Lathe Goes to College!

Indeed, and as a "professor"! After sitting for this portrait in Madison, this Gisholt No. 5 Ram Type Turret Lathe departed for a teaching role in a large West Coast university—to train future production engineers. Equipment of just a few years ago, although available at bargain prices, couldn't get in because of the vast improvements in machines like this Gisholt Turret Lathe.

Here's a lesson for industry, too. If modern equipment is so important in a teaching role, how much more important in a producing role—where speed and lower costs will be even more imperative in the days and years ahead.

Drill Breakage Licked by Tool Overload Kickout!

The problem of drill breakage has been solved by Gisholt engineers with this Tool Overload Kickout, mounted on a Saddle Type Turret Lathe. When tool torque builds up to the safety limit, the turret feed is automatically kicked out and the red light flashes on. The operator then backs out the drill, cleans out chips, runs drill back to working depth, presses re-set button—and resumes drilling. It takes but a few moments.



Light tells operator of drill overload.

GISHOLT

WORTH OUT OF MAN HOURS

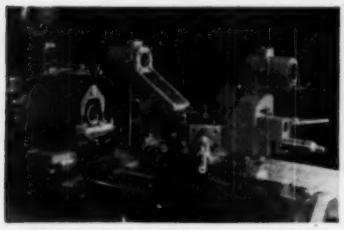
GISHOLT

COST CUTTING IDEAS

Spherical Boring of Pillow Blocks—"Soft" Work for the Fastermatic

Spherical boring presents a number of problems, particularly when the job must be done automatically and with precision.

For a case in point, take this pillow block. Not only is there an inside radius to be generated, but other operations such as machining of retaining and seal grooves must be done with accuracy and a fine finish. Moreover, there are many sizes of pillow blocks to be handled on this one machine.



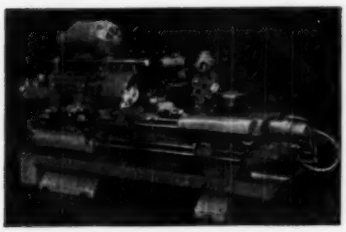
Fastermatic tooling set-up for pillow blocks.

The Gisholt 2F Fastermatic Automatic Turret Lathe was wisely chosen by this manufacturer. All work is done from the turret, with a special spherical boring tool for the inside radius, and a number of standard tools for boring, facing, necking, etc. The Gisholt Fastermatic not only turns out a completely machined pillow block every 3.5 minutes, but the spherical boring is done with a repeat accuracy of plus or minus .0005" every time.

Automatic Operation Cuts Costs

Because the cycle is completely automatic, the operator is able to tend another machine while these pillow blocks are being bored.

If your production calls for a maximum number of surfaces to be machined in one chucking, look into the Fastermatic. Six turret faces and two independent cross-slides provide a degree of flexibility not found in any other type of standard machine of comparable size. Operation is entirely automatic—giving you the speed to cut costs on a wide range of jobs.



The 2F Fastermatic—one of 3 sizes with swing over bedways ranging from 21" to 36½".

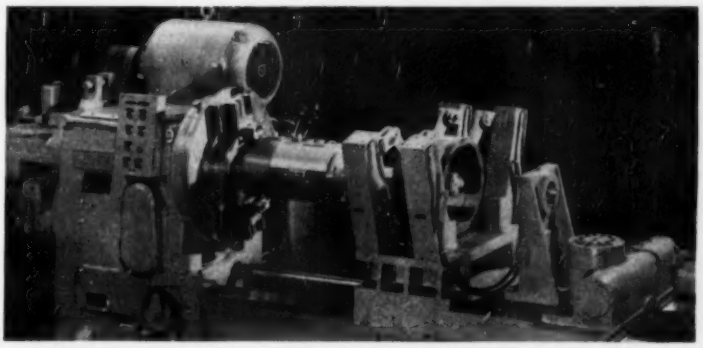
NEW ANGLE ON BEVEL GEARS

Old Angle for the No. 12 Hydraulic

Here is a case where bevel gear production called for a number of different sizes and types, no two having identical face or edge angles.

However, this manufacturer found the Gisholt No. 12 Hydraulic Automatic Lathe ideal for the job because slides could be arranged at almost any angle to the work.

Gisholt engineers solved the problem of dissimilar bevel gear production by arranging the lathe with pivoted and angularly adjustable front and rear slides, complete with tool relief for each. Combined with the heavy duty, air-operated tailstock, this machine can handle any bevel gear within its normal 12" swing over the front carriage.



TOOLS (NOT WORK) TURN ON THIS JOB!

These Simplimatics do more d----- tricks!

In this unusual lathe application for machining electric motor frames, the work is held stationary and the tools are mounted on the spindle.

With motor frame mounted in the fixture, the work carriage is fed toward the headstock, a single tool in the piloted spindle rough bores the frame. When boring tool has cleared work piece, carriage is traversed to the face of the spindle. Here a cam action within the spindle causes two tools to move outward to face the end of the frame. At the same time, two necking tools cut the snap ring grooves. When the facing and necking have been completed, these tools are withdrawn while the finish boring tool remains extended. The work carriage then drops into reverse feed for finish boring.

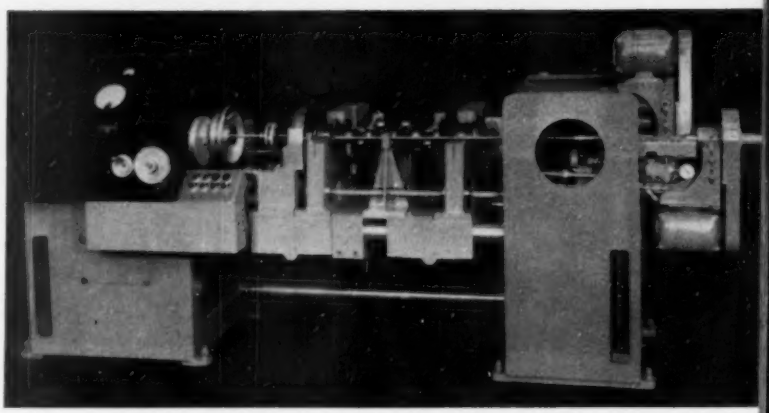
GISHOLT

UNBALANCE – located, measured, corrected

all on this ONE Gisholt Machine

Balancing is normally two operations—(1) finding and measuring the unbalance and (2) correcting or eliminating it. With today's high production requirements, the trend is to combine these operations with one machine doing both.

This Gisholt Balancer, the last word in such machines, serves a prominent automobile manufacturer, for balancing complete crankshaft assemblies. The machine determines the amount and location of unbalance and then makes the correction by drilling out metal from the heavy side of the flywheel and fan pulley. It does this with consistent accuracy, well within the tolerance of .3 ounce inches and at an average production of 30 complete assemblies per hour. It pays to keep up with Gisholt developments in balancing.

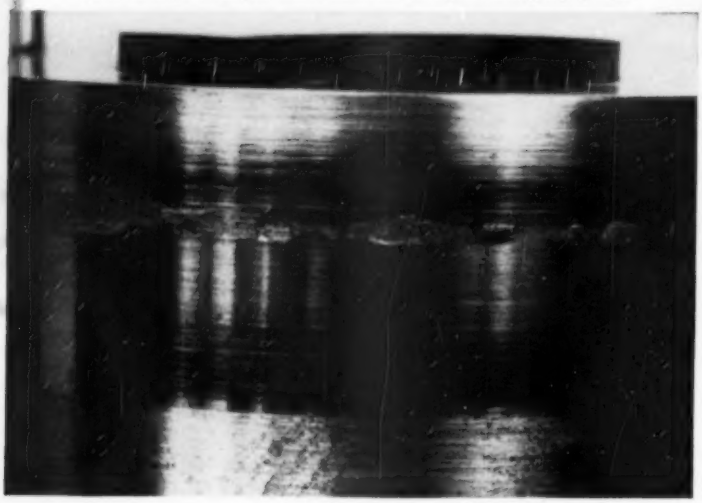


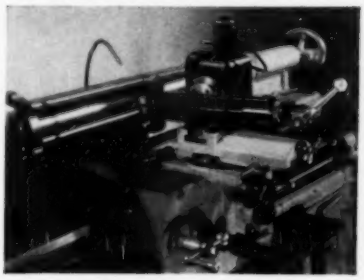
This single machine handles all operations on complete crankshaft assembly.

Stop it by Superfinishing!

Superfinish could have prevented this! Had this surface first been superfinished, it would have had nearly twice the load-bearing capacity and about three times the life. Galling is often caused by the lack of proper surface finish on the bearing journal. If you are faced with problems like this, you will be interested in the 80-page booklet, "Wear and Surface Finish," now in its second printing. Write for your free copy of this new text book on your business letterhead.

Photo shows galled surface which could have been prevented by Superfinish.





This oversize part was saved by Superfinish.

SALVAGING BY SUPERFINISH SAVES!

In addition to its prime role of surface finishing for longer wear, Superfinish offers other important benefits. Here is one of them. Cylindrically ground parts that are only slightly oversize, are difficult to relocate for accurate removal of small amounts of stock.

These can still be salvaged by Superfinishing if parts are not more than .001" oversize. The picture shows such a part being saved by a Superfinishing attachment. This may be mounted on one of your old engine lathes. Little time is required to then bring your parts down to correct size by Superfinishing with a free cutting stone. The cost of this Gisholt attachment is frequently offset by only a few such salvaged parts.

250

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Literature on Gisholt Turret Lathes, Automatic Lathes, Superfinishers, Balancers or Special Machines is available upon request.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THIS WIDE RANGE OF PUMPS MAKES SELECTION EASIER

COOLANT PUMPS
Centrifugal
Geared
Vane

LUBRICATING PUMPS
Geared
Vane

HYDRAULIC PUMPS
Geared

MISC. MACHINE PUMPS
Centrifugal
Geared
Vane

DIRECT DRIVE OR MOTOR DRIVEN

The wide variety of types and sizes available in Brown & Sharpe Pumps simplifies your selection of the right pump for the job.

Every pump in this line has distinctive features to assure economical, dependable long-life service. All have the same familiar standards of high quality that characterize Brown & Sharpe machine and tool equipment.

Make your selection with the help of our latest pump catalog. It includes illustrations, complete descriptions, installation dimensions and charts showing performance characteristics. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

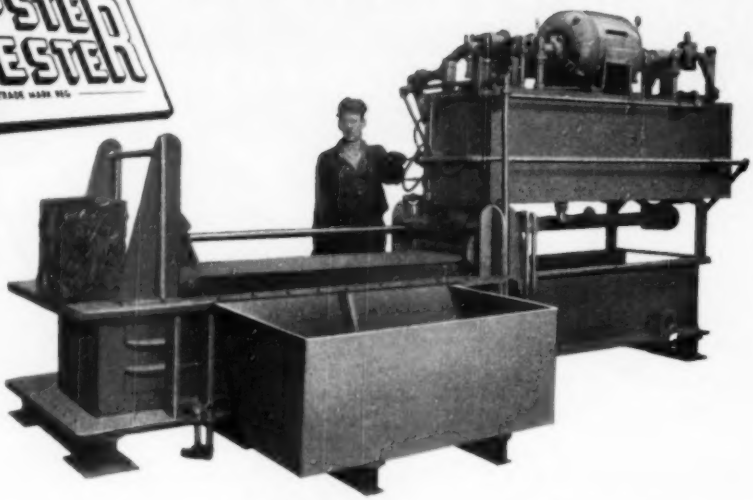
We urge buying through the Distributor

BROWN & SHARPE PUMPS

BUILT TO DELIVER THE

DEMPSTER BALESTER

TRADE MARK REG.



"128"

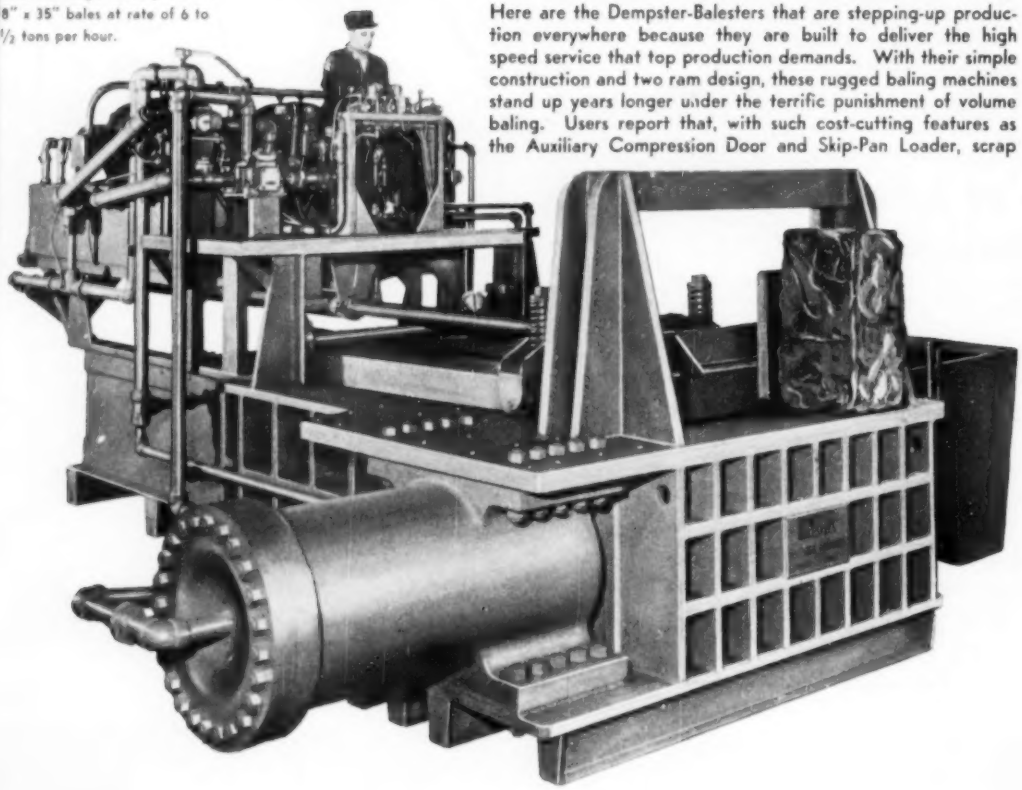
Portable press that produces compact bales measuring 10" x 12" x 16" at rate of 1½ to 2 tons per hour.

"600"

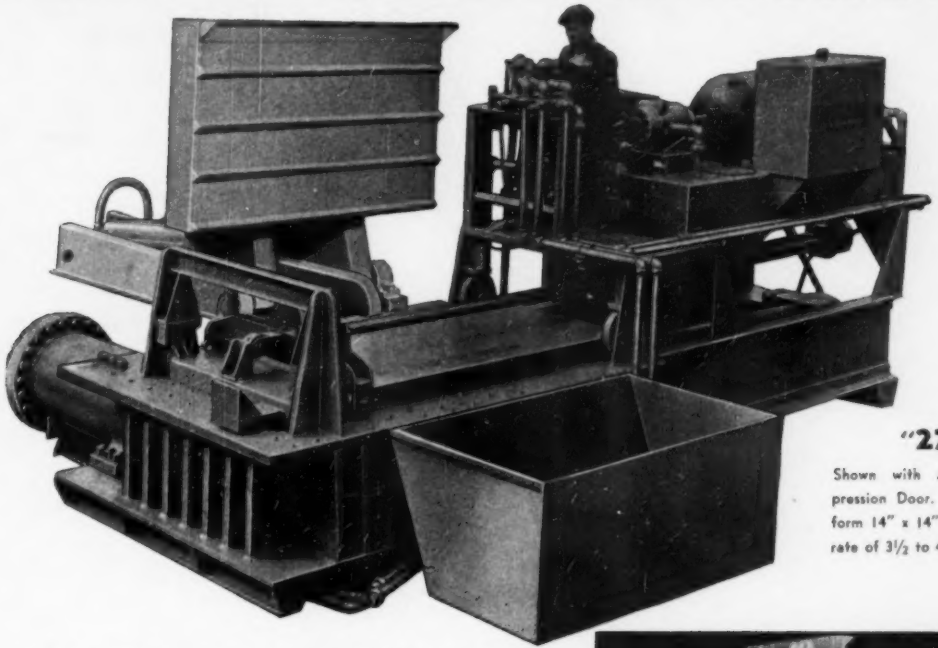
Turns out high density 16" x 18" x 35" bales at rate of 6 to 7½ tons per hour.

OWNERS REPORT...25% Production Increase With Auxiliary Compression Door!

Here are the Dempster-Balesters that are stepping-up production everywhere because they are built to deliver the high speed service that top production demands. With their simple construction and two ram design, these rugged baling machines stand up years longer under the terrific punishment of volume baling. Users report that, with such cost-cutting features as the Auxiliary Compression Door and Skip-Pan Loader, scrap



LOW-COST . . . HIGH-SPEED PRODUCTION THAT PROFITABLE BALING DEMANDS

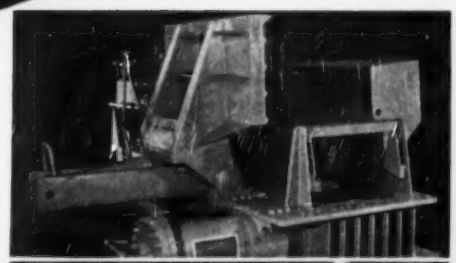


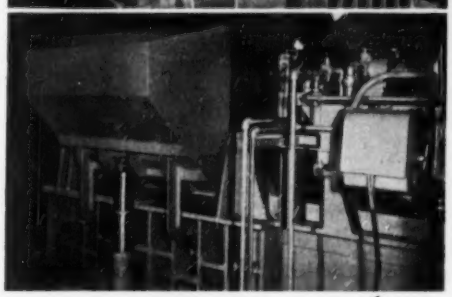
"275"

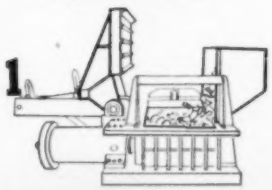
Shown with Auxiliary Compression Door. Produces uniform 14" x 14" x 22" bales at rate of 3½ to 4 tons per hour.

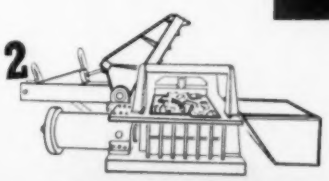
metal handling becomes far more profitable with a Dempster-Balester investment.

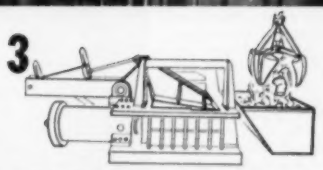
The hydraulically operated Auxiliary Compression Door, shown at right in top photo, compresses heaped scrap into the charging box with a force that ranges up to 45 tons on the various Dempster-Balester models. Users report a conservative 25% increase in production and as much as 40% decrease in cost per bale with the compression door. The hydraulically actuated Skip-Pan Loader, shown in lower photo at right, is standard equipment on all models. This invaluable feature permits preparation of a new full charge while press is baling. Shown below is the 1-2-3 production punch of a Dempster-Balester with Auxiliary Compression Door and Skip-Pan Loader. 1. Skip-Pan Loader dumps scrap metal into charging box. 2. Skip-Pan returns to loading position as door begins compression stroke. 3. Door compresses scrap, permitting charging box door to be closed without further arranging. During baling cycle Skip-Pan is reloaded and charge dumped into box as soon as bale is ejected. Write today for your copies of the folders on the Dempster-Balesters!











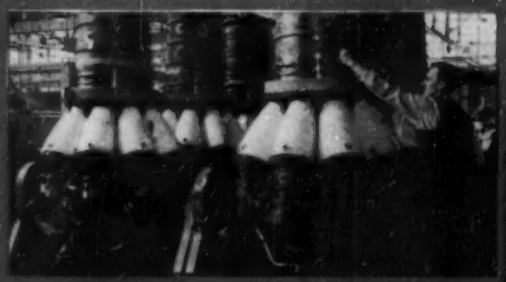
DEMPSTER BROTHERS, Inc., 420 DEMPSTER BLDG., KNOXVILLE 17, TENNESSEE

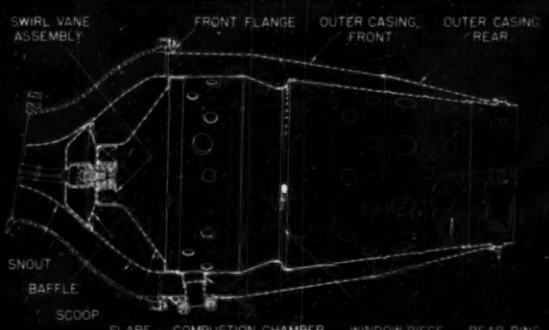
150-TON TRIPLE-ACTION LAKE ERIE HYDRAULIC PRESS . . . in the East Hartford, Connecticut plant of the Pratt & Whitney Aircraft Division of United Aircraft Corporation. 400-ton triple-action press appears in left background. These presses are used principally to draw stainless steel and Nimonic 75 parts for turbo-jet engines. The work done by these presses is probably the most accurate of metal forming operations performed in industry today. Extremely close tolerances are possible because of the complete control of pressing speeds and pressures that is possible with hydraulic units. This includes precision speed controls, pressure control and depth controls for the main ram and triple-action as well as individual pressure controls for the four corners of the blank holder. Press is shown drawing a long truncated cone in a single operation.

Precision is paramount at PRATT & WHITNEY AIRCRAFT

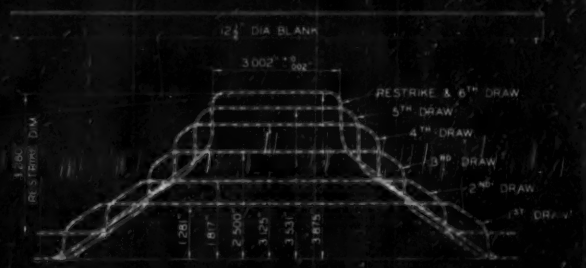
LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

Lake Erie Hydraulic Presses help attain it in the production of components for Turbo-Jet Engines





Cross-sectional diagram of the combustion chamber, or burner, of a JT-6 Jet Engine illustrating the assembly of stamped, deep-drawn and rolled and welded sheet-metal parts. Components of high-strength, heat-resistant stainless steel and Nimonic 75 must fit "perfectly" to permit proper assembly and dependable operation of the engine. Flexible and precise control of the hydraulic presses makes close tolerance production of deep-drawn parts possible.



One of the most interesting deep-drawn parts in the combustion chamber assembly is the flame-tube flare. This part, which is made of 0.048-inch Nimonic sheet, requires six draws each of which is followed by bright annealing. Deep-drawn parts of austenitic stainless and Nimonic are subjected to severe cold-working. Draw depth is calculated on a basis of the degree of work hardening that occurs.

Two of the principal materials used in the construction of the JT-6 "Turbo-Wasp" Jet Engine are a stainless steel of 18-8 analysis and a heat-resistant chromium-nickel-iron alloy known as Nimonic 75. Jet engine parts made from these materials are subjected to high temperatures and fatigue resulting from high velocity air flow. To stand up in service for any appreciable time and to meet the exacting requirements for mating fits in welding, the parts must be formed to extremely close tolerances. In producing components such as the flame-tube flare, flame-tube scoop, flame-tube snout, combustion chamber supports and bar sleeves, hydraulic presses in sizes up to 400-tons are employed for the deep-drawing operations. The flexibility of control that is built into hydraulic presses makes it possible to form these high-strength, heat-resistant, austenitic materials into the various components efficiently and with the utmost precision.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

★

General Offices and Plant:
507 Woodward Avenue, Buffalo 17, N. Y.

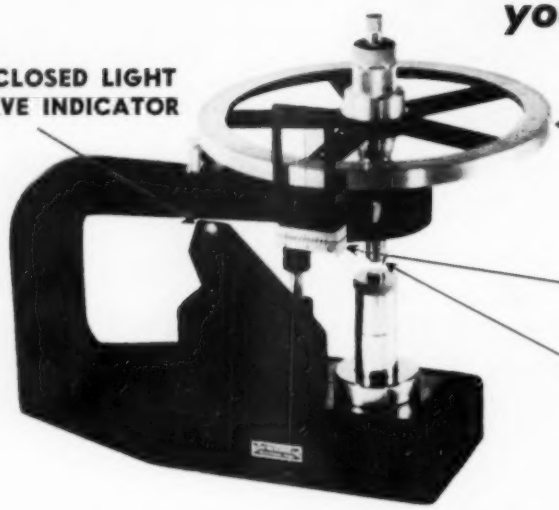
DISTRICT OFFICES IN NEW YORK, CHICAGO AND DETROIT

Representatives in Other Principal Cities in the United States and Foreign Countries

LEADING MANUFACTURER OF HYDRAULIC PRESSES — ALL SIZES AND TYPES — METAL WORKING ... PLASTICS MOLDING ... FORGING ... METAL EXTRUSION ... PROCESSING ... RUBBER VULCANIZING ... STEREOTYPE MOLDING ... PLYWOOD ... HARDBOARD ... SPECIAL PURPOSE

THE NEW Van Keuren 0 to 3" LIGHT WAVE MICROMETER

will improve your product . . .



CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request.

THE Van Keuren Light Wave Micrometer is an instrument of exceptional merit, proven over a period of 15 years. It has enabled hundreds of High School boys and girls to produce and inspect parts to "Hundred Thousandths" of an inch.

The New 0 to 3" Light Wave Micrometer has a ½" diameter, 40 threads per inch micrometer screw, which can be made with greater accuracy and which has 3 times the wearing surface of an ordinary micrometer screw. It has an 8" diameter micrometer wheel, with .0001" graduations 1/10" apart. It has a non parallax, vernier index which enables readings to be made to .00001". It has an index lock. It has carboloy tipped anvil and spindle. It is a sturdy, yet sensitive instrument which weighs 17 pounds. It is a portable measuring machine, built for "Sustained Accuracy."

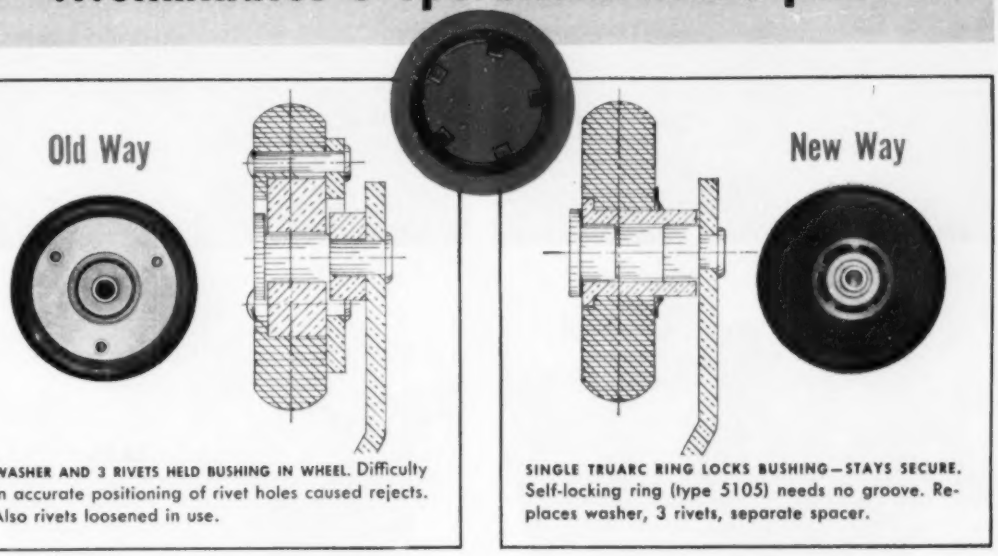
The Light Wave Micrometer is not a comparator. No gage blocks are needed and no errors creep in from worn blocks. It is a direct source of dependable precision—fast, accurate and profitable.

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

31st YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Single Truarc Ring Slashes Unit Cost 44% ...eliminates 3 operations and 5 parts



WASHER AND 3 RIVETS HELD BUSHING IN WHEEL. Difficulty in accurate positioning of rivet holes caused rejects. Also rivets loosened in use.

SINGLE TRUARC RING LOCKS BUSHING—STAYS SECURE. Self-locking ring (type 5105) needs no groove. Replaces washer, 3 rivets, separate spacer.

Redesign with one Waldes Truarc Ring cuts cost of wheel used in Har-Vey Rolling Door Hardware (for residential doors) from 26.1¢ to 14.5¢—a 44% saving for Metal Products Corporation, Miami. Use of Truarc cuts manufacturing time 76%. Eliminates 5 separate parts, 3 press operations. And gives a product that stands up better in use!

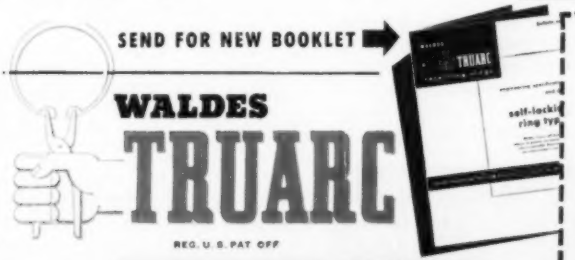
Redesign with Truarc Rings and you too will cut costs. Wherever you use machined shoulders, bolts, screws, nuts, cotter pins, snap rings, there's a Truarc Ring that does a better job of holding parts together. Truarc Rings are precision engineered. They make assembly and disassembly quick and easy.

See what Truarc Rings can do toward cutting overall costs for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

Redesign with Truarc self-locking ring produces these savings:

	saving
eliminates drilling 3 rivet holes	$.0042
eliminates riveting washer	.0111
eliminates punching washer	.00033
eliminates washer, spacer, rivets	.02236
cuts cost of inserting bushing	.00037
cuts cost of inspection	.0032
cuts cost of wheel, bushing, rivet	.0797
	.12126
less—cost of Truarc Ring	.00528
TOTAL SAVING PER UNIT 44%	$.11598

SEND FOR NEW BOOKLET



WALDES TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,382,948; 2,416,052; 2,420,021; 2,411,761 AND OTHER PATS. PEND.

Waldes Kohinoor, Inc., 47-16 Austel Place AM-022
Long Island City 1, N. Y.

Please send Data Book on Waldes Truarc Self-Locking Ring Types.

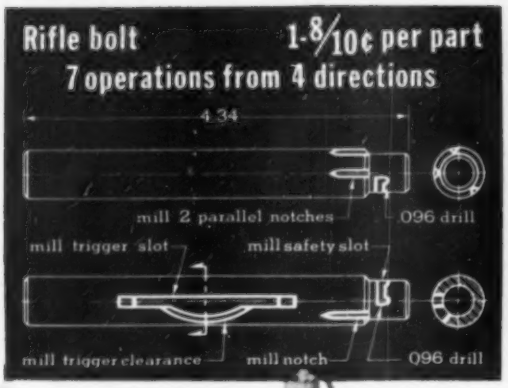
Name_____

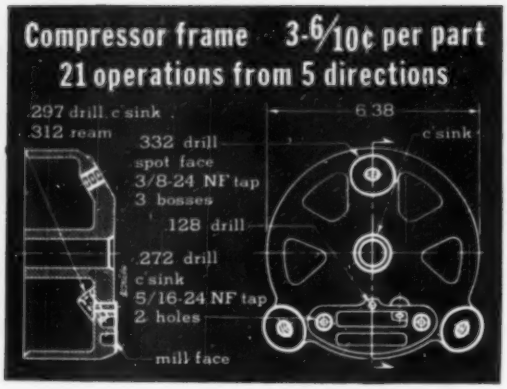
Title_____

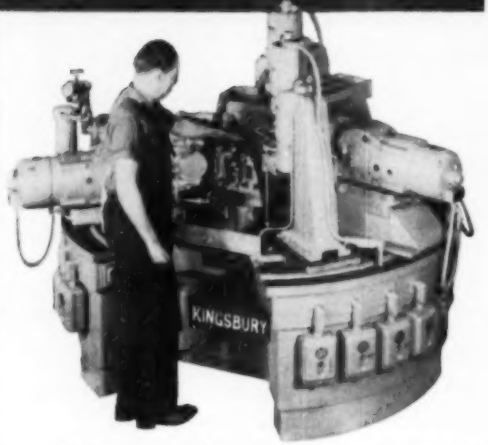
Company_____

Business Address_____

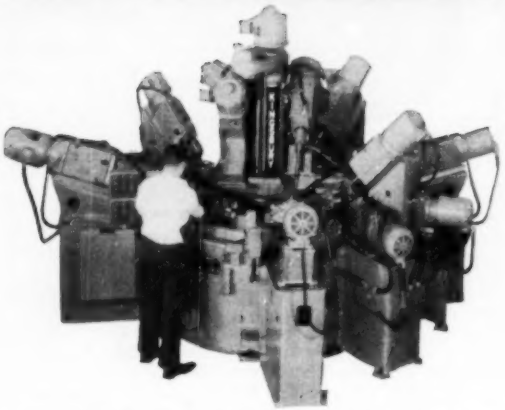
City_____ Zone_____ State_____







295 PARTS AN HOUR GROSS. A 20-inch power index table has seven fixtures. Two horizontal units off the radial lines drill the holes. Three radial horizontal units mill the slots and trigger clearance. Two vertical units mill the three notches.



390 PARTS AN HOUR GROSS. A 60-inch power index table has eight fixtures. At three stations nine units operate on three bosses. At four stations nine tools work from the front and units on the central column do the angular hole from the rear.

Combined operations cut

Single-purpose drilling and tapping machines, built to each customer's needs, produce much more per man-hour

Dear Sir:

General-purpose machines can do the operations above. But these Kingsburys do them much cheaper and much faster. A Kingsbury does thousands of operations each hour — all automatically. One operator loads and unloads the parts.

Units perform the operations

A suitable drilling or tapping unit does each operation. If necessary we add a milling attachment or multi-spindle auxiliary head. Each unit is automatic and has its own motor (1/3 to 5 hp). Units can be horizontal, vertical or at angles. (By the way, all 16 units for the compressor frame are at angles.) In one chucking of a part, a Kingsbury can do a variety of operations from many directions.

Uniform, accurate machining

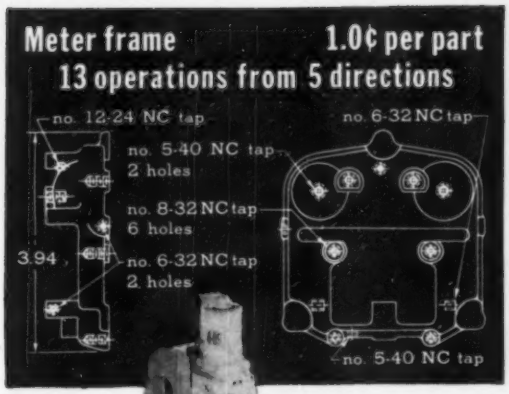
Machining is uniform. Each unit has an automatic cycle and cam feed that do not vary. All fixtures on any one machine are interchangeable. Each machine does many operations on the part while it stays in its fixture and no one touches it.

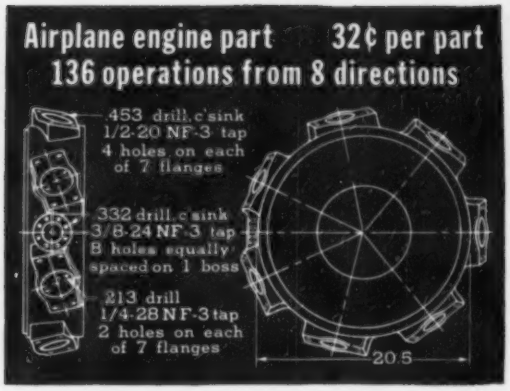
Tools work to close tolerances. Bushings guide drills and reamers. The bushings are in the fixtures or in plates that pilot to the fixtures.

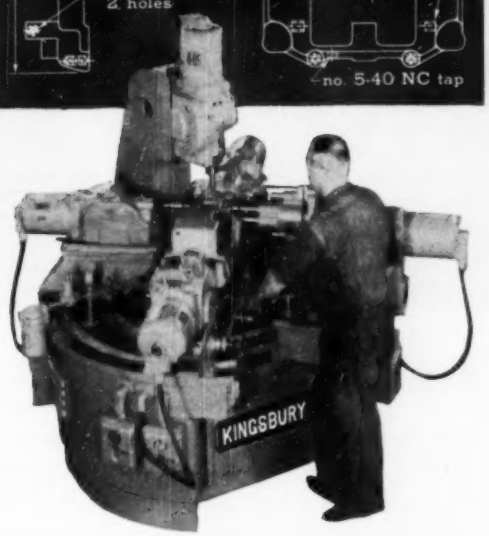
You are the boss

You name the output rate and the operations and approve the sequence. You approve our fixture design before we start engineering. You approve samples before we ship the machine.

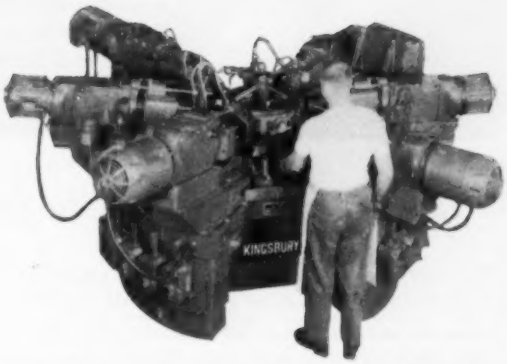
Our key men take a real interest in your machine. They know it by name. If someone mentions an order number they ask, "Whose machine is that?" They attend to your requests on safety features, electrical equipment, tool holders, guide bushings, paint, etc. Even the president and vice-president







360 PARTS AN HOUR GROSS. One vertical and four horizontal units tap five sides of the same part at the same time. There is no indexing. Three units have multi-spindle auxiliary heads. Two Kingsburys ahead of this setup drill these and other holes.



21 PARTS AN HOUR GROSS. One part at a time indexes on its axis. 1/7 turn per index. Three angular units drill the flanges after indexes 1 to 7, countersink after 2 to 8 and tap after 3 to 9. Three horizontal units do the eight holes after indexes 1 to 3.

cost and increase output

spend most of their time on proposals and machines for our customers.

The crucial moment

Your Kingsbury arrives. (Ten to one it's on time.) You remove the skids and rust-proofing, level it, connect the power and air lines, run off samples and inspect them. You call the front office. "That new Kingsbury is in production. Do you want to see it?" It is as simple as that.

That is one reason why plants keep on buying Kingsburys. Since the last war ten plants have paid us $4,072,690 for new equipment, none of these ten under $200,000. (Don't let this scare you. Some plants may require only *one* Kingsbury.)

Can we save you money?

It costs nothing but a little time and a stamp to get a firm proposal. Just send a print to our Mr. L. A. Carll. Tell him the operations and hourly output you need. Or ask him for free bulletins showing 53 setups.

Sincerely,
Kingsbury Machine Tool Corp.
120 Laurel Street, Keene, N. H.

About the costs on the drawings

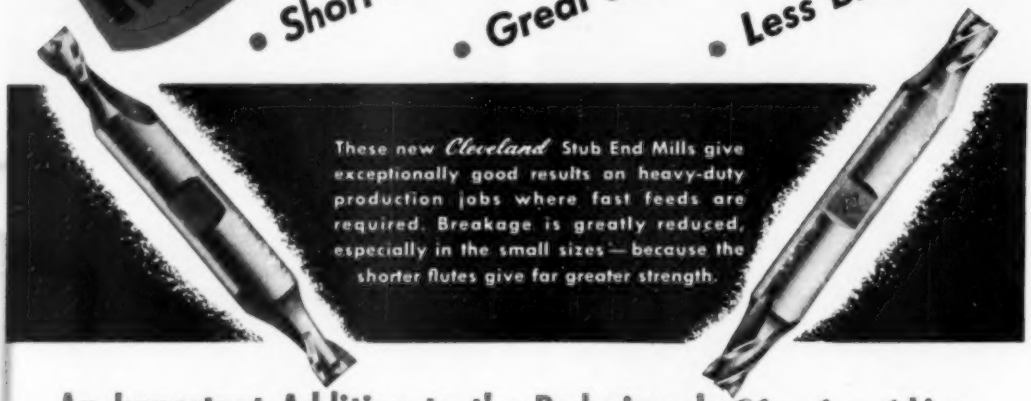
Each unit cost includes the man and machine on all operations shown – no power or overhead. We assumed three things: 1) 80% efficiency, 2) Each man's wage rate would equal the national average for such work, 3) The entire cost of each machine and tooling would be paid for after only 6000 hours of operation, a fraction of its useful life.

KINGSBURY

AUTOMATIC DRILLING & TAPPING MACHINES
for Low-Cost High Production

NEW! *Cleveland* STUB END MILLS

• Short Flutes! • Great Strength! • Less Breakage!


These new Cleveland Stub End Mills give exceptionally good results on heavy-duty production jobs where fast feeds are required. Breakage is greatly reduced, especially in the small sizes—because the shorter flutes give far greater strength.

An Important Addition to the Redesigned *Cleveland* Line

The new Stub End Mills have all the features of the redesigned ***Cleveland*** End Mills that have enabled these tools to set new records of performance wherever they have been tested. They have been carefully engineered to give you *More Cuts per Grind, Consistent Accuracy, Faster Production* and *Greater Economy.*

STRONGER No sharp corners or points where localization of stresses might occur. Minimum amount of metal has been cut away. (Stub End Mills have an *extra* factor of strength due to their shorter flutes).

CLEAR CHIPS BETTER Redesigned flutes are machine polished. There are no pockets. Chips are free to move.

GREATER ACCURACY New clearance and accurate machine polish of flutes result in closer control of size.

MORE DURABLE New-style clearance supports the cutting edge; assures against "flaking" or "chipping out".

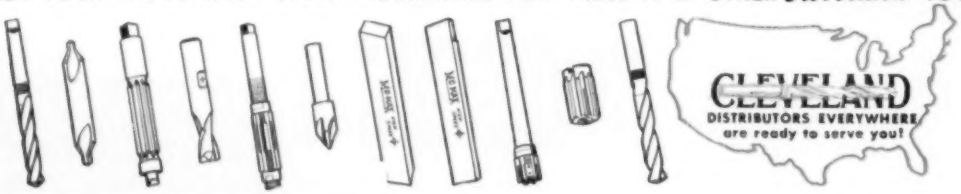
LONGER LIFE Radically new flute shape and chip clearing ability reduce wear on the cutting edge, thus maintaining consistent accuracy.

CUT FASTER New flute shape gives maximum cutting qualities at increased rates of feed.

Telephone Your
Industrial Supply Distributor

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street • Cleveland 14, Ohio
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5 • Los Angeles 58
E. P. Barrus, Ltd., London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER *Cleveland* TOOLS



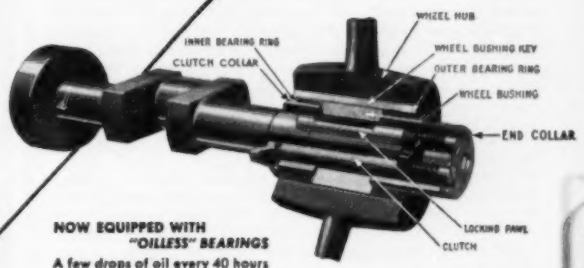
Why Press Users Call the Bliss Rolling Key Clutch

"The Most Dependable Positive Clutch Available"

In these illustrations, you see some of the engineering features that have made the Bliss Rolling Key Clutch the most specified and widely used press clutch on production lines everywhere.

The proof-in-operation is being demonstrated by the performance of thousands of these clutches in Bliss Inclinable and Straight Side presses. Here, the ruggedness and precision that are built into the Rolling Key Clutch assure consistent efficiency, even under the most severe stamping conditions . . . year after year. And its fast-engaging action keeps pace with high-speed requirements.

No other positive mechanical clutch offers the combination of advantages enumerated on this page.



NOW EQUIPPED WITH "OILLESS" BEARINGS

A few drops of oil every 40 hours of operation takes care of all clutch lubrication.

The Rolling Key Clutch on Bliss Inclinable and Straight Side presses provides for constant fast engagement and high speed with a minimum of attention.

1. CAN BE ENGAGED MORE FREQUENTLY OVER LONGER PERIODS OF TIME. The clutch keys—set *close* to the axis of the shaft—"roll" into instant, complete engagement without "side kick" on the flywheel. Four engaging positions assure quick, smooth starting, resulting in more working strokes per minute.

2. POSITIVE MECHANICAL ACTION TRANSMITS ALL THE FLYWHEEL ENERGY DIRECTLY TO SHAFT WITHOUT POWER LOSS.

3. PEAK EFFICIENCY AT HIGH SPEED. Rugged, oversize clutch keys take driving load as thrust, not shear—give smooth, sure action.

4. NO SLIPPAGE, NO STICKING. Crankshaft is locked to wheel in both directions; yet either or both keys are easily locked out for die setting or "bumping" press.

5. CAN BE SET FOR SINGLE STROKE, CONTINUOUS OR AUTOMATIC OPERATION—MECHANICAL OR AIR OPERATED. Latch bracket action is at right angles to clutch—cannot be forced aside. Disengagement is complete and entirely spring cushioned.

6. EASY MAINTENANCE. Wear is kept to a minimum by even distribution of bearing load. All wearing parts are readily replaced.

These features sum up why press users call the Bliss Rolling Key Clutch "The most dependable positive clutch available," and credit it as one of the major reasons why they continue to specify BLISS Inclinable and Straight Side presses.

Clutch disengaged—wheel running free. Clutch and locking keys are set as close as possible to shaft axis to keep impact speed at minimum.

Clutch engaged—wheel *locked* in both directions. Rolling action of rugged, oversize keys reduces starting shock, prevents backlash.

Write Today for This New Bliss Literature

Inclinable Press Catalog 2-C Inclinable Press Service Sheet A-105

Straight Side Press Bulletin 17-B

E. W. BLISS COMPANY, TOLEDO 7, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

ASK ABOUT OUR NEW DEFERRED PAYMENT PLAN

1-3 years to pay 25% down

3¼% average yearly interest on original balance. No finance charges.

BLISS BUILT

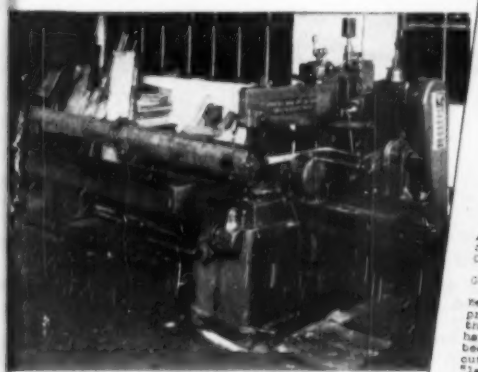
BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD...

WHICH IS BETTER FOR YOU, HACK SAWS OR BAND SAWS?

Reading Chain & Block Corporation found the answer by contacting the MARVEL field engineer. Only a MARVEL engineer could analyze this problem without bias because only MARVEL makes both hack saws and band saws. As a result, Reading bought three different types to most efficiently handle their metal sawing. A No. 6A machine for production cutting of identical pieces, a No. 4B machine for fast, accurate, miscellaneous cutting, and a No. 8 band saw machine for cutting of structurals, mitering, and other miscellaneous work.

Whatever your metal sawing problem, there is among MARVEL'S 11 different series of sawing machines, a saw or saws that will exactly meet your needs. Your local MARVEL Engineer will gladly study your sawing problems, make recommendations and quote prices.

No. 8 MARVEL Metal Cutting Band Saw. This most versatile saw takes work up to 18" x 18", mortises, miters or roughs to shape.



No. 9A MARVEL Production Saw (world's fastest) automatically feeds, measures and cuts off identical pieces from nested or single bars up to 10" x 10" cross section.

READING CHAIN and BLOCK CORPORATION

Materials Handling Equipment

READING, PA. U.S.A.

October 24, 1947

Armstrong-Blum Mfg.Company
5700 West Bloomingdale Avenue
Chicago, 39, Illinois

Gentlemen:

We have in our shop three Marvel Saws which are used all day in production work for the cutting of materials in connection with the manufacture of hoists and cranes. Since these three saws have been used in our plant the cost of cutting materials has been greatly reduced, and the speed at which the materials are cut has been increased to such a point that we no longer have "lay overs" due to the lack of materials.

We wish to assure you at this time that when we need more automatic saws in our plant, we will definitely give you first consideration to install the Marvel saws in our plant.

Whenever it has been necessary for any repair service, or engineering service, to be applied to these saws, we have never had to wait or inquire the second time for these services. That is one thing that has kept us in production to this date.

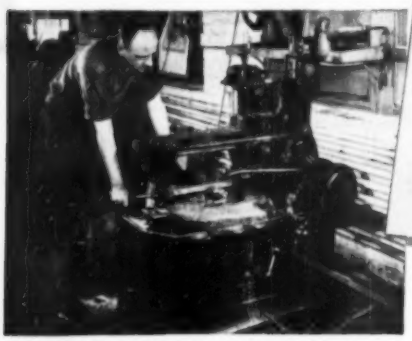
Again assuring you that your services and attentions to our requirements have been very satisfactory, we remain,

Very truly yours,

READING CHAIN & BLOCK CORP.

Fred M. Howard
Purchasing Agent

F.Hrakh



No. 4B MARVEL Hign Speed Saw is a moderate priced, very fast 6" x 6" capacity saw. Here it ideally meets the requirements of the maintenance department.

MARVEL Metal Cutting SAWS

Better Machines—Better Blades

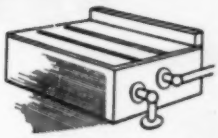
ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

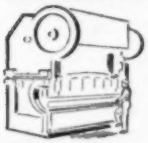
5700 Bloomingdale Ave. Chicago 39, U.S.A

Simplify production with economical vapor degreasing

BEFORE INSPECTION



BEFORE PLATING



AFTER STAMPING

AFTER MACHINING

BEFORE AND AFTER production steps, Vapor Degreasing can save you time and cost. In one operation, in one minute or less, it thoroughly removes grease and oil from parts made of most materials—of any size or shape. And it reaches almost inaccessible places . . . leaves parts clean, warm and dry.

Get outstanding results with new, improved "Triclene" D Trichlorethylene

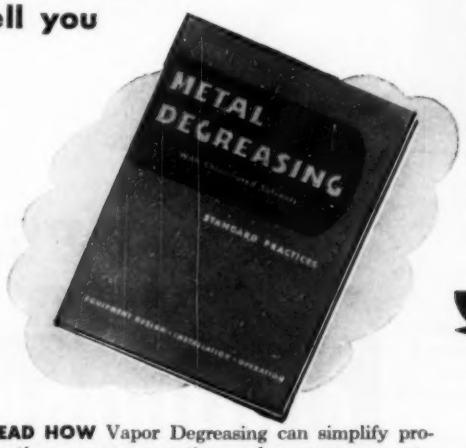
ELECTROCHEMICALS DEPARTMENT
DU PONT
"TRICLENE" D
METAL DEGREASING GRADE TRICHLORETHYLENE
E. I. DU PONT DE NEMOURS & CO. (INC.) WILMINGTON 98, DELAWARE

"TRICLENE" D is the most stable grade of Trichlorethylene yet developed by Du Pont for metal degreasing. It stands up against contaminating and destructive materials which may be introduced in degreasing . . . assists materially in carrying out efficient cleaning.

INTRODUCING "PERCLENE" D

A new degreasing grade of Perchlorethylene for use in metal drying and other vapor degreasing operations in which a higher boiling solvent may be desirable.

Let this book tell you



READ HOW Vapor Degreasing can simplify production . . . save you time and unnecessary costs. Read why the results obtained can't be matched by any other method. It shows typical compact equipment available for efficient and economical operation. And it gives information about solvents used in this equipment—Du Pont "Triclene" D Trichlorethylene, and Du Pont Trichlorethylene and Perchlorethylene—which under various trade marks have been widely used for many years. Send for it today!

DU PONT non-flammable SOLVENTS for VAPOR DEGREASING

SOLD NATIONALLY THROUGH DISTRIBUTORS

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

CLIP THIS COUPON—MAIL TODAY!

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Delaware

Please send me my copy of "Metal Degreasing—Standard Practices."

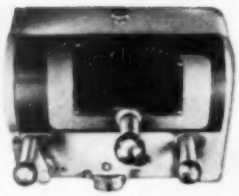
Name_____

Position_____

Firm_____

Address_____

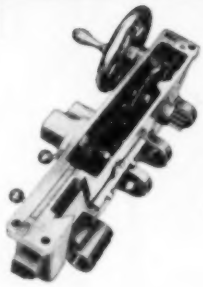
4



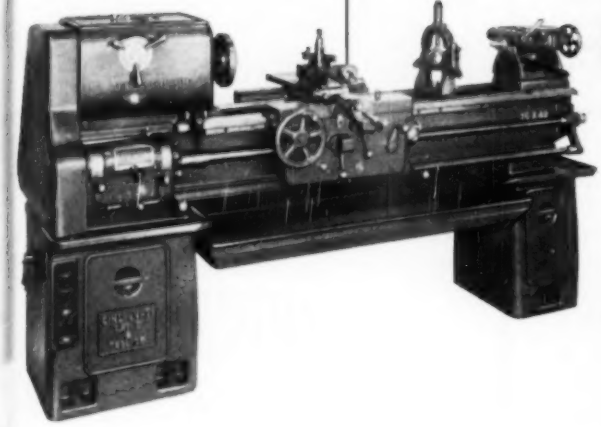
3

GET MORE

2



5



The completely new Tray-Top Cintilathe gives you more valuable features than any other lathe in its price class. 10", 12½", 15" and 18" swing sizes. Distance between centers from 18" to 60".

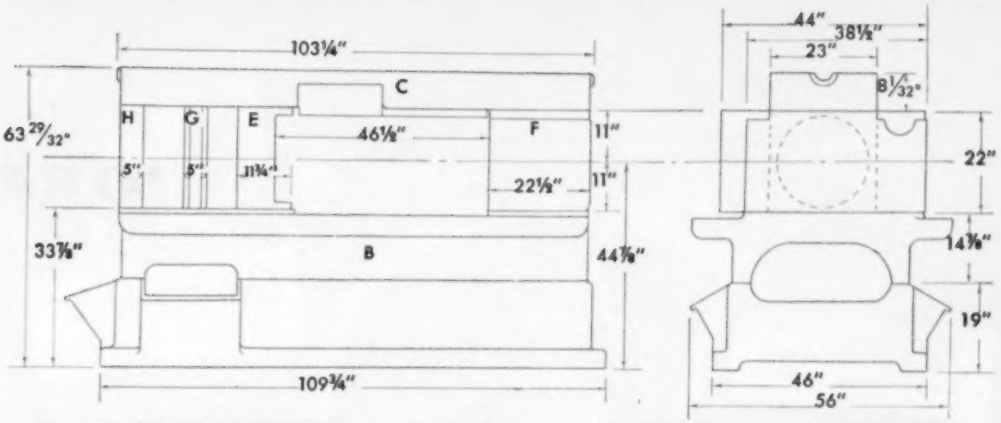
PAY LESS

Here are 10 practical reasons for making your next engine lathe a Tray Top: **(1)** Tray-Top on headstock and tailstock provides convenient "parking space" for tools. **(2)** 12 spindle speeds selected by color-coded dial, all geared transmission featuring flame hardened gears. **(3)** 48 thread and feed changes. **(4)** Unusually large spindles – rigidly mounted in precision anti-friction bearings – two on the 10" and 12½" size – three on the 15" and 18" size machines. **(5)** Double wall apron. **(6)** Totally enclosed change gear box. **(7)** Simple unique method of changing from English to Metric thread chasing or vice versa. **(8)** Enclosed electrical panel. **(9)** Optional drive, reversing motor control or multi-disc clutch and brake. **(10)** Cabinet legs . . . 15" and 18" sizes can be furnished with gap and gap block. **WRITE FOR BULLETIN T-100.**

cintilathe

the best buy in its class

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO



H, G, E — HEADSTOCK SUPPORTS Weight — 1233 lbs.

B — BASE Weight — 6655 lbs.

C — TOP BED Weight — 1232 lbs.

F — GEAR BOX Weight — 841 lbs.

BE VALUE WISE OR OTHERWISE

True of any "means goods," the purchase price of any Multiple Spindle Bar Automatic is only relative. It is "high" or "low" on the basis of the total cost of its total services, compared to other brands. Important items of total cost are those of operation and maintenance.

Machine analysis will invariably disclose the low cost operation and maintenance features that have been "built into" a machine. Such features are built into the CONOMATIC, beginning with its very foundation. The figures above substantiate the claims below.

THE 1½" Six Spindle MACHINE FRAME:

1. **Provides greater capacity for handling work.**

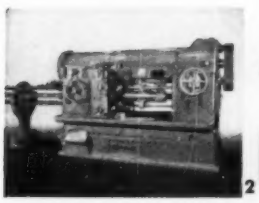
The Frame provides a LONGER TOOLING AREA, with more positions and accommodations for tooling and attachment applications, with more clearance and conveniences for faster tool setting, than are provided by any other "automatic."

2. **Provides better support to work and tools.**

The Frame provides better support and alignment to headstock members, tool slides, and other units and mechanisms, with BASE SUPPORT CLOSER TO THE WORK AXIS, with BETTER TOP BED SUPPORT TO SHORTER, "WEAVE PROOF," UPRIGHTS, and, with larger, heavier, and stronger, Top Bed and Base, than are provided by any other "automatic."

3. **Provides greater accessibility for lower cost operation and maintenance.**

The Frame provides a more orderly arrangement of, and easier access to, all units, mechanisms, parts, and adjustments, than can possibly be provided by any "automatic" that does not have a VISIBLY ACCESSIBLE, NON-INTERFERING CAM SYSTEM.



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

DUPLICATE PARTS OR DO REGULAR LATHE WORK . . . Get instant changeover ONLY with the COPYMATIC!

When you're buying a lathe for *production* work, you're interested in *production* figures . . . actual shop records . . . NOT engineering tests, performed under ideal conditions. The figures above are on daily production, reported by COPYMATIC owners who compared their COPYMATICS with lathes formerly used.

Practical for large and small shops, the Lodge & Shipley COPYMATIC gives the *versatility* of the engine lathe and the *productive capacity* of automatic duplication . . . *without* the limited use and high cost of a special purpose machine.

From round or flat templates, the COPYMATIC accurately duplicates square shoulder faces, grinding necks, tapers in both directions, chamfers and curved contours.

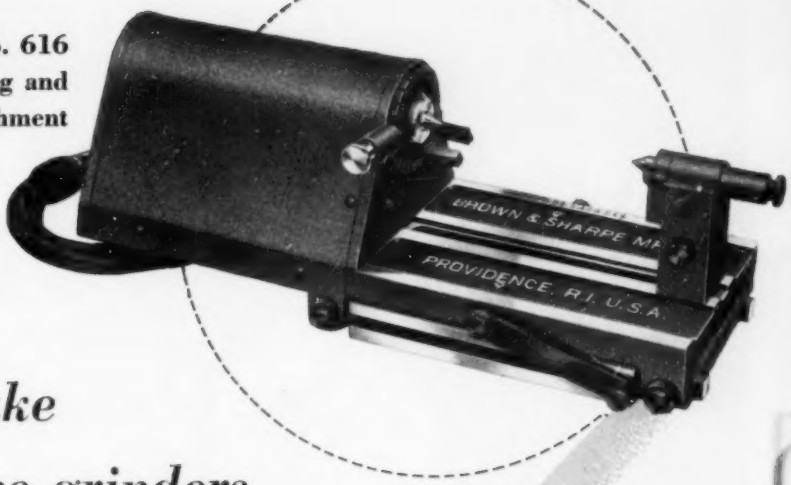
Often, the additional cost of making a special template is eliminated. The first piece of the lot is turned, using the machine as a standard lathe and then inserted between the template supports and used to produce the rest of the lot automatically.

The COPYMATIC can be a profitable producer in your shop. Ask your Lodge & Shipley Representative for details or write for Bulletin No. 675.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
CHOREMASTER DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

The Versatile No. 616 Cylindrical Grinding and Indexing Attachment



How to make your surface grinders pay EXTRA dividends...

You can use your surface grinders for dry grinding small cylindrical work, tapers and work requiring indexing, by equipping them with the Brown & Sharpe No. 616 Attachment. If you have only a limited amount of this work to do, the No. 616 can avoid the addition of another machine and a major expenditure.

On this easily portable attachment, straight cylindrical or tapered work is ground between centers, or if ½" diameter or less, work can be held in indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

The No. 616 attachment is compact, inexpensive yet precision-built. Motor is totally enclosed. Bearings, permanently sealed. Centers are hardened both in headstock and tailstock. Get complete information on the details and advantages of No. 616 . . . write for Bulletin. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

No. 616 Attachment in use on a Brown & Sharpe No. 2L Surface Grinding Machine. Capacity of Attachment: centers swing 6" diameter; take work 5¼" in length. Maximum grinding angle, 45°.

We urge buying through the Distributor

BROWN & SHARPE

HERE'S MOTOR REPAIR SERVICE

THAT WILL SAVE YOU MONEY!

A-C Certified Service Shops, like Cincinnati Electric Equipment Company shown, have modern equipment and expert personnel for fast emergency service . . . for routine maintenance and repair that keeps your production rolling smoothly.

WHEREVER YOU ARE, there is a nearby Allis-Chalmers Certified Service Shop to keep your motors and other electrical equipment running smoothly. These independent shops are selected after careful investigation for their up-to-date equipment, experienced personnel, good business practices and will to serve. They use only factory-approved parts and methods.

When you need repairs or maintenance on motors and other electrical equipment, depend on Allis-Chalmers Certified Service. Write for a list of the Certified Service Shops near you.

For New Motors and Control...

No one knows more about correct motor and starter application than your A-C Certified Service Shop. When you need new motors or starters, check with the one in your area or with your nearest A-C Sales Office.

ALLIS-CHALMERS, 999A SO. 70 ST. A-2935
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

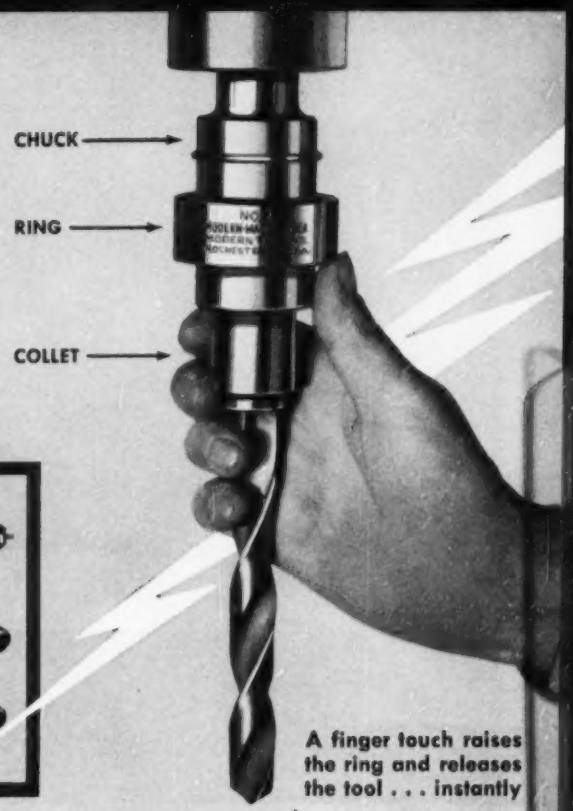
A-C

ALLIS-CHALMERS

Speed up your production

Change tools without stopping . . . or even slowing the machine

MODERN-MAGIC QUICK CHANGE CHUCK and COLLET EQUIPMENT



A finger touch raises the ring and releases the tool . . . instantly

A few examples of the many tools, shown with collets attached, driven by MODERN-MAGIC CHUCKS

Modern Precision Tools Include . . . . .

- STATIONARY SELF-OPENING DIE HEADS
- ROTARY SELF-OPENING DIE HEADS
- STATIONARY COLLAPSIBLE TAPS
- ROTARY COLLAPSIBLE TAPS
- MODERN-MAGIC CHUCKS AND COLLETS
- SELF-OPENING STUD SETTERS
- INSERTED BLADE FACE MILLING CUTTERS
- SOLID ADJUSTABLE DIE HEADS
- ADJUSTABLE HOLLOW MILLING TOOLS
- UNIVERSAL CHASER GRINDING FIXTURES

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

For full information, send for Bulletin M-103. In addition to standard Modern-Magic Chucks and Collets, it shows special types of each.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

G.S. GEARS HELP *Century* MOTORS STAY ON THE JOB!

Century is very particular about the component parts for their products. They feature: "*Century* Motors *stay on the job*—provide satisfactory performance throughout a *long* motor life". It's obvious that only the *finest* Gearing would fill the bill for them . . Gears that give trouble-free performance day in and day out, with economy and smooth operation. Small wonder they specify G.S., for as the world's largest exclusive manufacturers of Small Gears, we've got a lot of tricks up our sleeve to assure the kind of performance required. Don't take chances on the Small Gears you need. Specify G.S.! Recommendations, cost estimates, without obligation. Write now. Or, send for the catalog-bulletin described below.

SEND FOR *free G. S. catalog-bulletin, describing many different types and applications of our Fractional Horsepower Gears.*

FRACTIONAL HORSEPOWER GEARING

GS

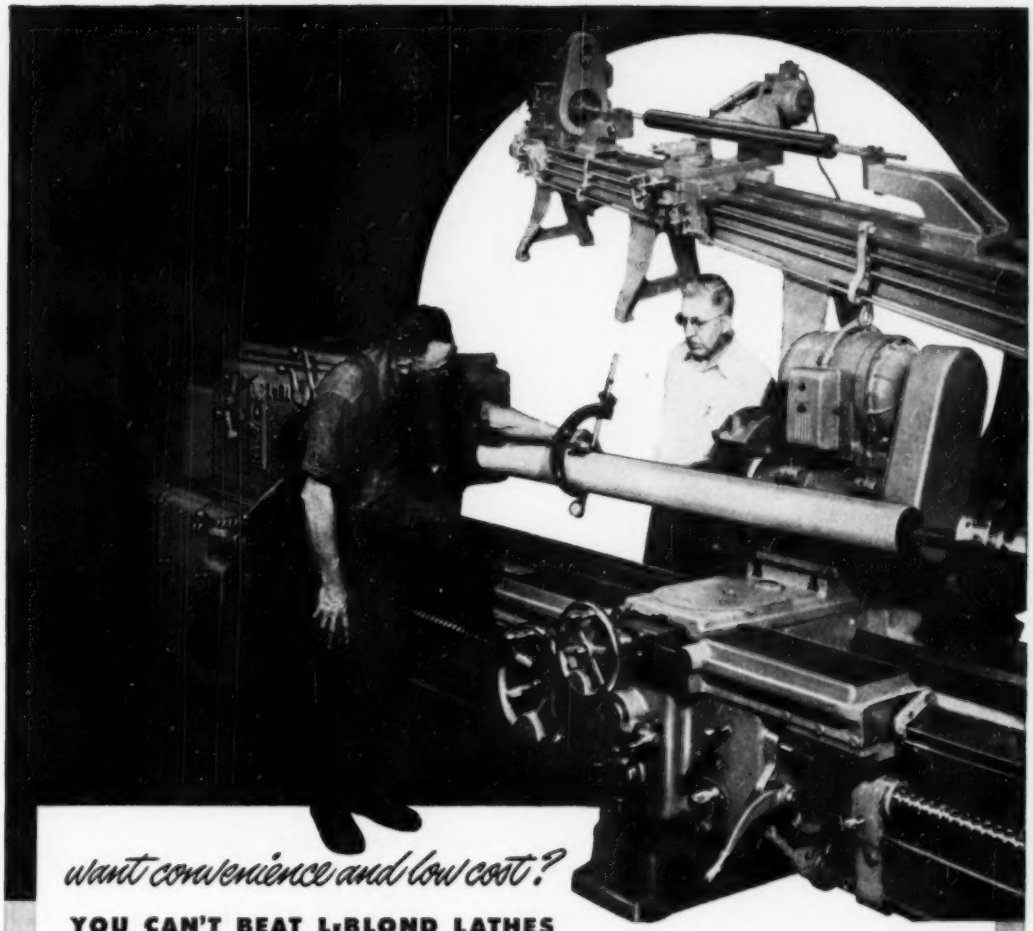
GEAR Specialties

Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding

MEMBER OF AGMA

2635 WEST MEDILL AVENUE · CHICAGO 47, ILLINOIS

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS



want convenience and low cost?

YOU CAN'T BEAT LeBLOND LATHES FOR POLISHING PRESS ROLLS

The special LeBlond Roll Grinding Lathes are without equal for fast, accurate, low cost grinding and polishing of press rolls. If yours is a newspaper, printing shop, or publishing house, LeBlond meets your needs with the special dual purpose Regals in two sizes: The 19" with 2 H.P. grinder which will handle all rolls from 3" to 9" diameter; and the 24" with 2 - or 3 - H.P. grinder which will accommodate rolls up to 14" diameter. Both Regals double as engine lathes.

Or, if your press runs are counted in hundred thousands, and you need greater power, LeBlond's special 25" heavy duty lathe with 5 H.P. grinder will take any roll up to 13" diameter. It, too, is adaptable for metal turning.

Both the Regals and the Heavy Duty combine the turning facilities of a lathe with the polishing action of a grinder, mounted on the carriage. You can order any bed length that meets your requirements. Learn now how LeBlond roll grinding lathes can help you cut costs.

WRITE FOR

descriptive folders

THE R. K. LeBLOND MACHINE TOOL CO. CINCINNATI 8, OHIO
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
SALES OFFICES: New York, Chicago, Detroit

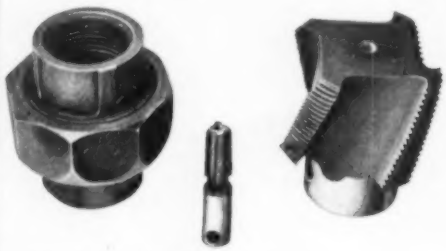
LeBLOND

look what can happen when you

refuse to be satisfied with "EXPECTED PRODUCTION"

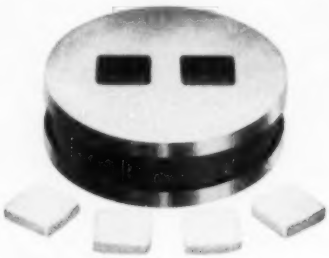
from tools and dies . . .

Many tooling men have said: " . . . Our tools are running along O.K.—things are satisfactory". Yet, after these men discovered a more foolproof way to select the proper steel for the job, they wondered why they were ever satisfied with "average" tool and die performance. And look at the results they are enjoying:



Operators Objected to the Change . . . But Now They Are Convinced!

Everyone claimed these taps for threading cold forge unions were running along "O.K.". But the T.R.F. wasn't convinced. He used the Carpenter Matched Set Method to pick the one steel best suited for the job—SOLAR (Water-Tough). Now production is up 350%—and today the operators *insist* on taps made from SOLAR! It can happen in your plant—if you *refuse* to be satisfied with "Expected Production".



Production Was Considered "Satisfactory" . . . But That Didn't Stop This Toolmaker:

This die preforms tablets from Bakelite powder on a preform press. Even though the highly abrasive plastic created a wear problem, production was considered "satisfactory". Yet, in a desire to investigate every possibility for reducing costs and boosting output, the toolmaker changed to a steel in the Carpenter Matched Set. Now, with K-W (Water-Wear), the die lasts twice as long as those previously considered "satisfactory"—and 8 to 10 hours are saved between grinds!

Existing production records *are* being broken daily, tools and dies *are* producing more, giving less trouble. And tooling men who are no longer satisfied with "Expected Production" are cashing-in on lower costs. The Carpenter Matched Set Method has *proved* it can help you do the same. Best of all, it is amazingly easy to use because it is simplification itself! It simplifies selection, heat treatment, inventories—practically all toolmaking operations. You'll never know the job it can do unless you try it. Prove it to yourself—it's easy. Simply pick out a job—put the Matched Set Method to work—then compare results!

Export Department, 233 Broadway, New York 7, N. Y. "CARSTEELCO"

—And you can get IMMEDIATE DELIVERY from LARGE STOCKS!

Carpenter

MATCHED

TOOL & DIE STEELS

Offices and Warehouses in Principal Cities Throughout the U.S.A. and Canada

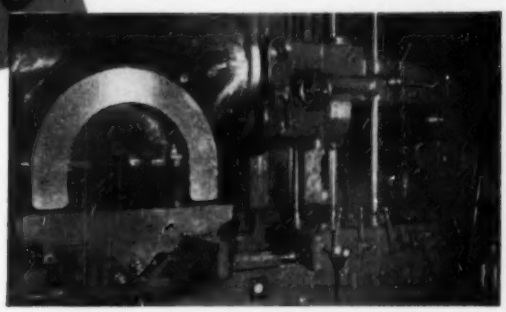
THE CARPENTER STEEL COMPANY, 109 W. Bern St., Reading, Pa.

4" Universal Boring Machine boring 3" Discharge Centrifugal Pump.

CALL IT *User Preference* for UNIVERSAL

NOW . . .

BULLARD - *Universal* BORING, DRILLING and MILLING MACHINE . . .



Face milling massive section of Double-suction Pump.

Customer satisfaction is tested and here are the findings:

"Performance plus" is a user comment.

Another user states "We replace Universals with Universals."

Still another says "When we put a job on this tool, it comes off right. We had decided on another make but after seeing and studying Universal, we changed our minds."

One satisfied customer has used Universals since 1925. At present he has five in his plant, one recently purchased, two 10 years old, a fourth 16 years and the fifth with 18 to 20 years of service.

These comments, plus Bullard Proficiency in Engineering, are reasons why you should investigate and study Bullard-Universals for your shop. Write today for data on 3-4 and 5-inch spindle machines.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

ARMSTRONG

TOOL HOLDERS... for every operation!

There are **ARMSTRONG** Tool Holders in sizes and types for every operation on lathes, planers, slotters and shapers —for the heaviest cuts; for the most delicate cuts.

With Standard shaped cutters, bits and blades of **ARMSTRONG HIGH SPEED, ARMALOY** (Cast Alloy) and **ARMIDE** (Carbide-Tipped) they provide a system of tooling that assures maximum production per machine hour, lower tool costs, and higher machining profits.

These permanent multi-purpose tools can be picked up as needed from your industrial distributor. Use them wherever possible to increase number of pieces per hour, to lower cost per pieces.

Write for Our New S-48 Catalog.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

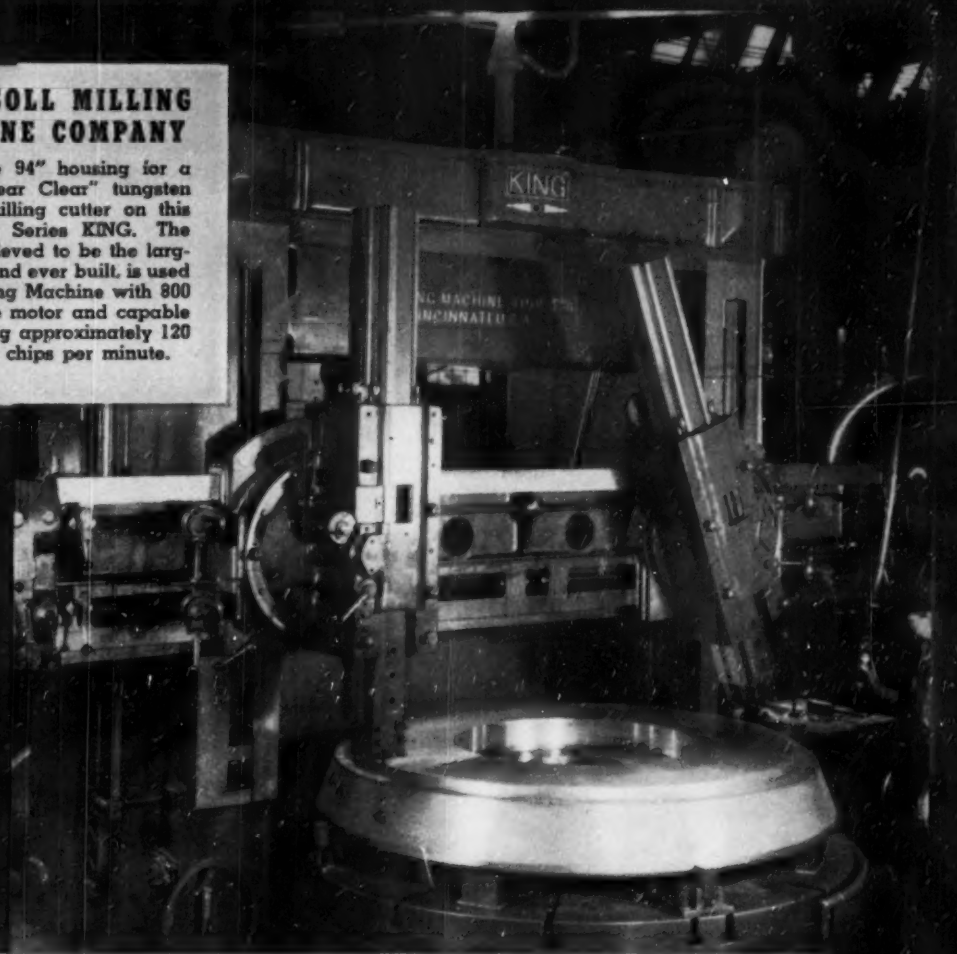
5215 W. Armstrong Ave. Chicago 30, Ill.

BIG THINGS ARE BEING DONE BY KING

VERTICAL BORING & TURNING MACHINES

INGERSOLL MILLING MACHINE COMPANY

turned the 94" housing for a giant "Shear Clear" tungsten carbide milling cutter on this 100" New Series KING. The cutter, believed to be the largest of its kind ever built, is used on a Milling Machine with 800 H. P. drive motor and capable of removing approximately 120 bushels of chips per minute.



New savings in machining time, increased production, improved quality of work—these, too, are "big things" being accomplished by KING Vertical Boring & Turning Machines the nation over . . . Ten sizes: 30", 36", 42", 52", 62", 72", 84", 100", 120", and 144" . . . New catalogs now available. When writing, specify size machines which your work requires.

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

NATCO OFFERS YOU

the long and short of it

FOR GREATER SAVINGS...

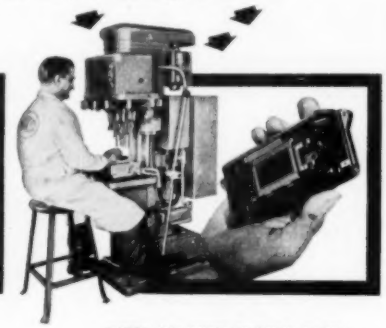
Multi-Drilling, Tapping and Boring

The illustrations here show the wide range of work possible on NATCO drilling machines. Whether your problem involves very large, medium size or very small parts, there is a NATCO machine to suit your purpose.

The NATCO HOLESTEEL Machine at left is a giant capable of precision drilling 105 holes in the huge cylinder block shown below. Hole sizes range from .3125 to 1.0156.

In meeting the requirements of the smallest light sensitive work, the A-33 Multi-spindle Driller and Tapper shown below is outstanding. The plastic camera case is multi-drilled on four sides by a battery of these A-33 machines turning out highly accurate work at the rate of 250 parts per hour. The 29 holes drilled range in size from .0465 to .281.

Regardless of the size of your job, it will pay you to call a NATCO Field Engineer for profitable suggestions.



NATCO C6A HOLESTEEL MACHINE and a massive tractor engine casting machined on it for a large manufacturer.

NATCO A33 LIGHT SENSITIVE MULTI-DRILLER AND TAPPER and small camera part drilled on a battery of A33's.

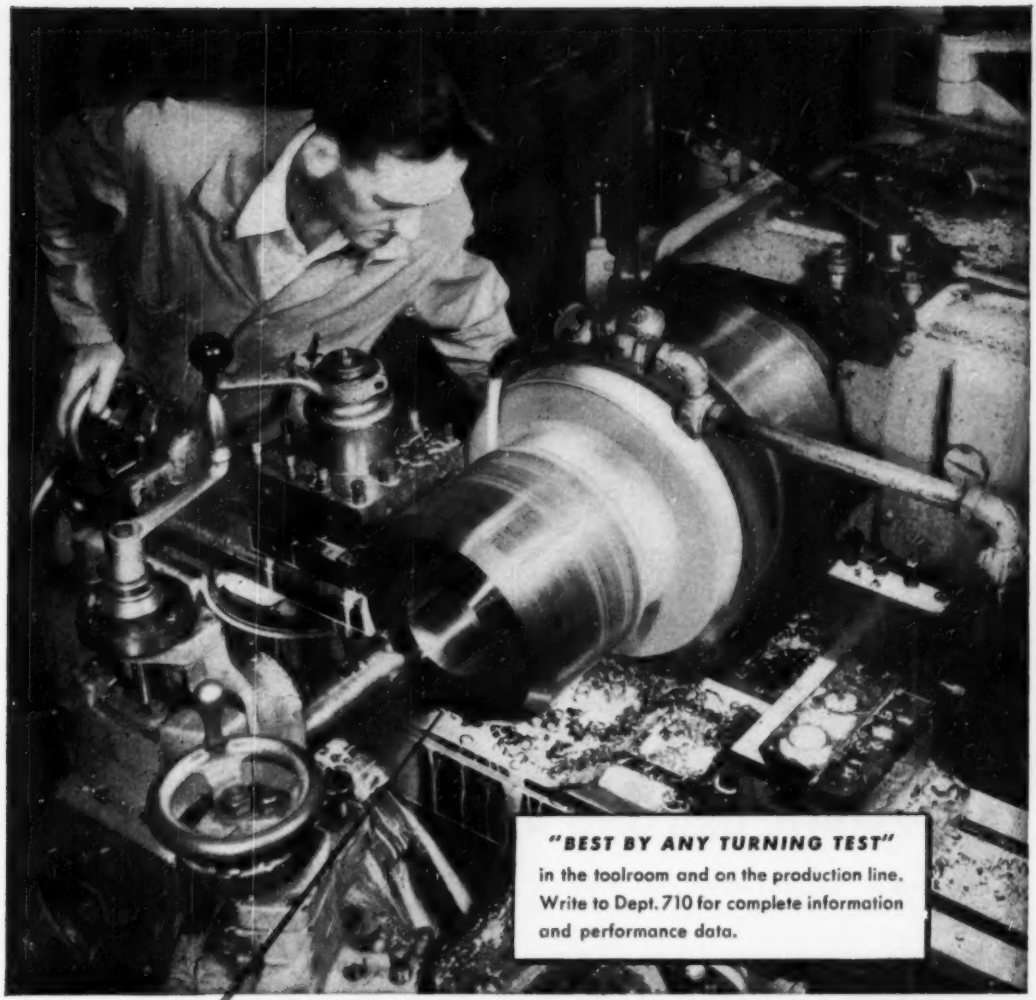
➧ WRITE TODAY for "Success Stories From the Brief Case of a NATCO Field Engineer" . . . NATCO, Richmond, Ind.

Call a Natco Field Engineer

Offices

1809 Engineering Bldg., Chicago
409 New Center Bldg., Detroit
1807 Elmwood Ave., Buffalo
2902 Commerce Bldg., New York City

National Automatic Tool Co., Inc.
RICHMOND, INDIANA, DEPT. A.M.


"BEST BY ANY TURNING TEST"
in the toolroom and on the production line.
Write to Dept. 710 for complete information
and performance data.

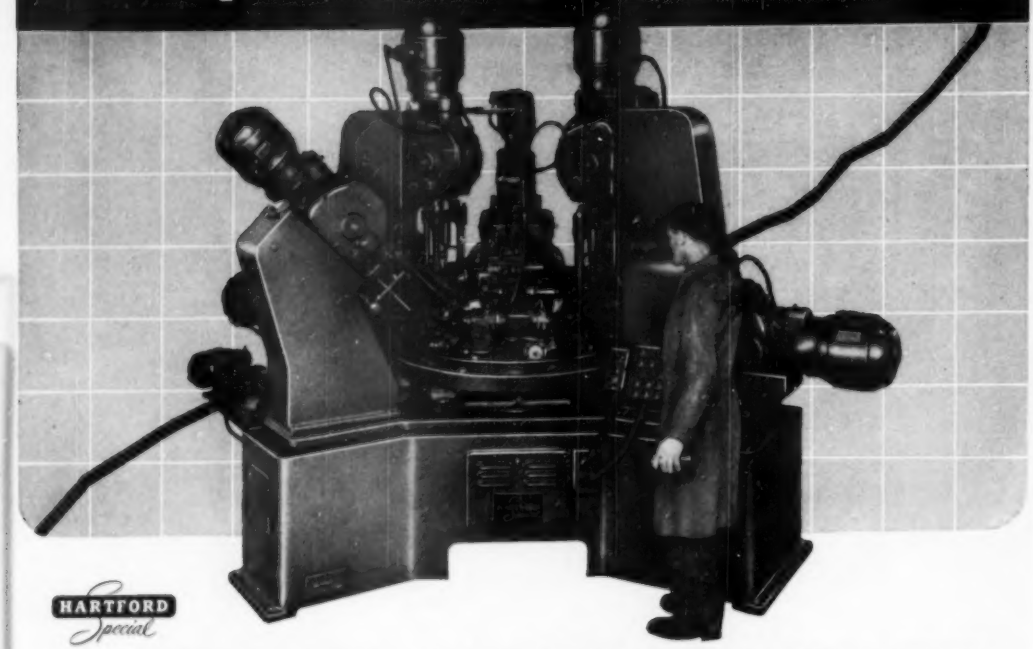
Jones & Lamson turret lathes are BUILT and

POWERED TO PRODUCE

MORE CHIPS **per tool**
MORE PIECES **per hour**
MORE PROFIT **per job . . . than any turret lathe of comparable size!**

Turret Lathe Division **JONES & LAMSON**
MACHINE COMPANY
Springfield, Vermont, U.S.A.
MACHINE TOOL CRAFTSMEN SINCE 1835

rapid-fire production



HARTFORD Special

AUTOMATIC DRILLING AND TAPPING MACHINES

This machine combines speed and precision. Pieces are held to a close tolerance, yet finished at the rate of 9 seconds each. This six station machine drills and countersinks 4 holes, drills and spotfaces one, and drills and taps 4 holes, using only nine units. Fixtures holding the pieces revolve and are automatically indexed. Electrically interlocked system provides for individual or group operation. Sensitive control arranged with jogging feature allows units to be cycled individually and simplifies setting up and spot checking. Foolproof loading arrangement with automatic knockoff, special chip disposal system, and many other features are incorporated into the design.

with

"Packaged Engineering"

If you're looking for economy and production in a single purpose machine, investigate the advantages of "Packaged Engineering" that make Hartford Special Drilling and Tapping Machines your best buy in the long run. Write our Engineering department now. The Hartford Special Machinery Company, Hartford 5, Connecticut.

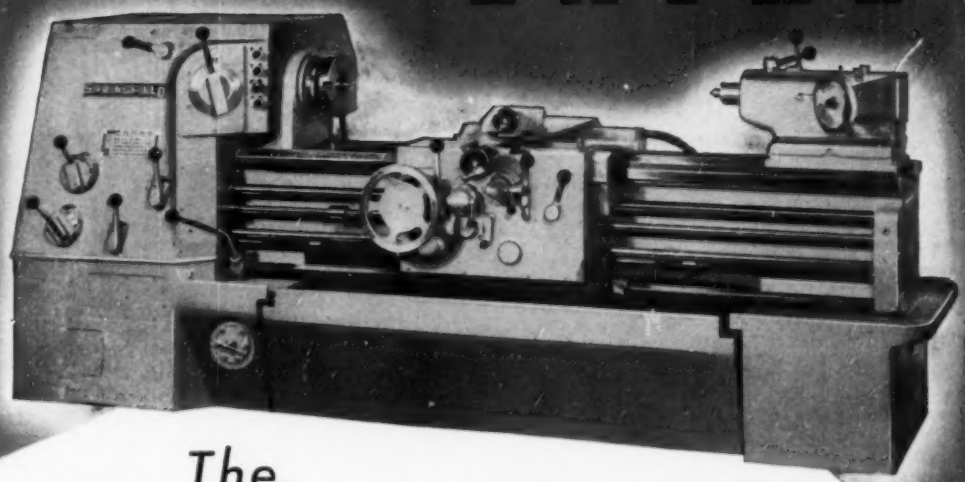
HARTFORD Special

...the standard for special machinery

Remember

For special applications, Drilling and Tapping Units with or without attachable heads are available individually.

New SPRINGFIELD Model S LATHE



The "World's Best Investment" in Lathes

NEW engineering designs give greater precision, rigidity and production capacity.

NEW control applications result in greater operating ease and efficiency.

NEW combinations of modern lubrication methods combat wear and reduce operating costs.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

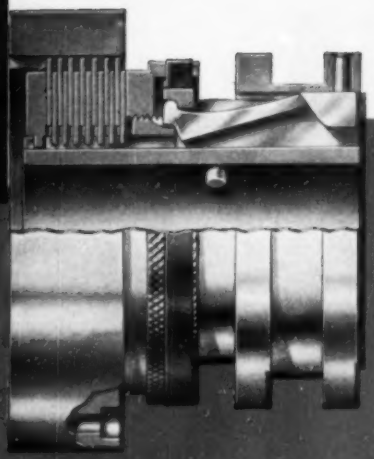
GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

MAXITORQ

KEEPS

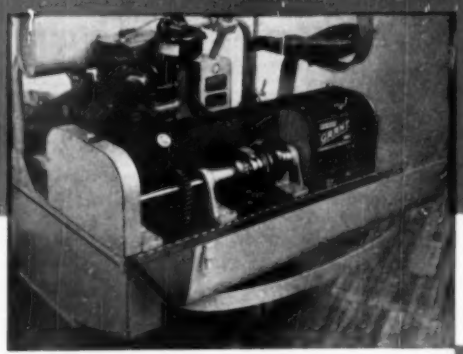
GOOD COMPANY



The G. H. Tennant Co. has joined our "Good Company" roll by adopting a double Maxitorq multiple disc clutch as original equipment for its Industrial Power Sweeper, the first device of its type to have vacuum dust control. The installation controls forward and reverse direction of the machine and is also used as a brake.

They say, "Sweeper must be highly maneuverable, capable of short-radius turns, easy steering." *Maxitorq answers all three requirements.* Also, "Quick forward-reverse clutch action is needed to save time." *Maxitorq saves the time.* Again, "Smooth clutch action causes less wear on sweeper, makes it safer to operate, is less fatiguing on driver." *Three more O.K.'s for Maxitorq.* They also add, "It has long life . . . it's easy to adjust."

You might think we and this customer are at least first cousins, but that's not the case. It's just an appreciated testimonial from another satisfied Maxitorq user. If you require dependable power transmission within the capacity of Maxitorq Clutches (fractional to 15 H.P. at 100 r.p.m. . . . wet or dry, single or double) we will immediately send engineering data on request.



Send for Catalog AM2

10/50

THE CARLYLE JOHNSON MACHINE COMPANY

MANCHESTER • CONNECTICUT

Why HUNT RABBITS with a TANK?

on Most Jobs a KRW 100-TON PRESS WILL EQUAL HEAVIER, COSTLIER, EQUIPMENT and SAVE YOU MONEY!

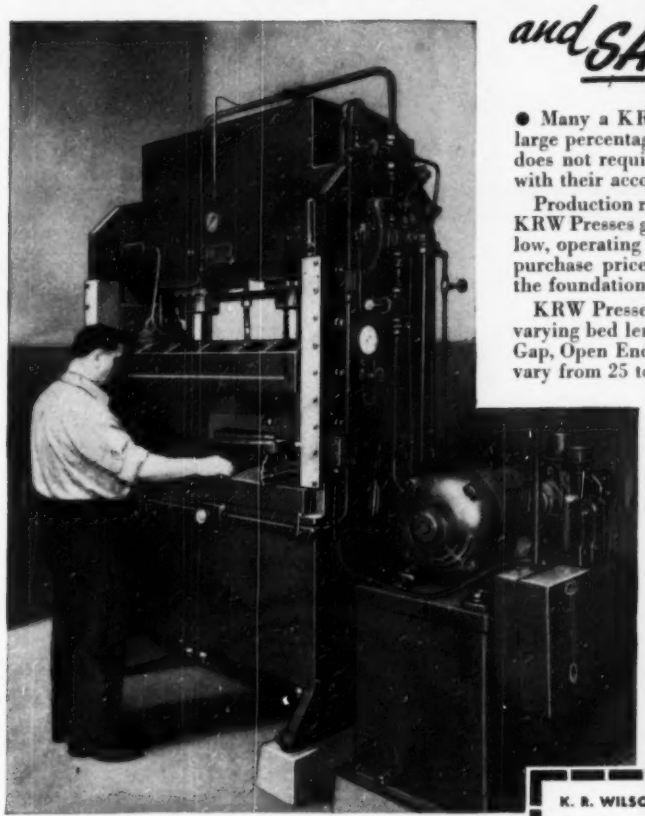


Illustration shows a KRW 100-Ton Hydraulic Press in plant of Elrae Pressed Metals, Inc., Buffalo, N. Y. When the picture was taken, bicycle parts were being formed.

● Many a KRW Press user discovered long ago that a large percentage of forming, drawing and stamping work does not require the use of large, heavy-tonnage presses with their accompanying high initial and operating cost.

Production records, in a variety of industries, show that KRW Presses greatly reduce costs. First investment is very low, operating costs are still lower. In one instance, the purchase price of a KRW Stamping Press was less than the foundation cost for heavier equipment.

KRW Presses are highly flexible...they can be built in varying bed lengths. KRW Presses are available as either Gap, Open End or Closed End Types. Tonnage pressures vary from 25 to 100 tons. Because they are hydraulically operated and not mechanically driven, they are quiet and vibrationless in operation. Platens can be stopped and reversed at any point in their travel.

Let us know your needs...we are fully equipped to engineer our equipment to handle your work. In the majority of cases, we can make delivery in a fraction of the time required for other type presses. Let us hear from you.

ALL TYPES OF DIES. We are equipped to engineer and build dies to meet your specifications. All we need is available technical data, blueprints and, where practical, a sample piece of work. We'll quote prices and delivery date.

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send me complete information on new KRW 100-ton Hydraulic Presses.

Name _____

Address _____

City and Zone _____ State _____

11

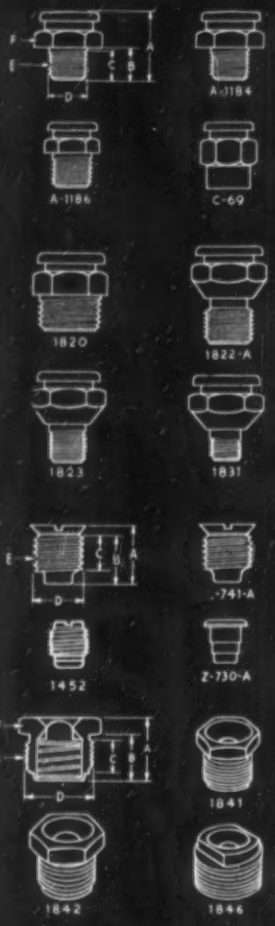
Genuine ALEMITE

Button Head and Flush Type Fittings

DATA SHEET
NO. 2

Simplify ORDERING, INSPECTION and INVENTORY CONTROL. Specify Alemite part numbers on your blueprints.

Useful Information to Help You Select and Specify the Right Alemite Fitting for Every Bearing



STANDARD BUTTON HEAD FITTINGS

Part No.	DIMENSIONS					
	A	B	C	D	E	F*
C-69	29/32"	13/32"	9/32"	39/64"	1/8" P.T. Female	5/16"
A-1184	11/16"	11/32"	19/64"	13/32"	1/4" P.T.	5/16"
A-1186	53/64"	27/32"	5/16"	35/64"	1/4" P.T.	5/16"
A-1188	61/64"	31/64"	27/64"	43/64"	3/8" P.T.	3/8"
A-1190	1 5/64"	35/64"	31/64"	27/32"	1/2" P.T.	7/16"
1396	1"	1/2"	13/32"	43/64"	3/8" P.T.	3/8"
1401	53/64"	27/64"	7/16"	35/64"	1/4" P.T.	5/16"

*Wrench Size.

GIANT BUTTON HEAD FITTINGS

Part No.	DIMENSIONS					
	A	B	C	D	E	F*
1820	1 1/16"	1/2"	13/32"	27/32"	1/8" P.T.	7/16"
1821	1 9/16"	9/16"	7/16"	7/8"	5/16"-18 Thd.	7/16"
1822-A	1 5/16"	9/16"	29/64"	43/64"	3/8" Spec. P.T.	7/16"
1823	1 1/4"	1/2"	3/8"	35/64"	1/4" P.T.	7/16"
1825	2"	41/64"	11/32"	43/64"	3/8" P.T.	7/16"
1831	1 5/32"	5/8"	5/32"	1/2"	1/4" P.T.	7/16"
**1871-A	1 5/16"	9/16"	29/64"	43/64"	3/8" P.T.	7/16"
**1872-A	1 1/4"	1/2"	3/8"	35/64"	1/4" P.T.	7/16"

*Wrench Size. **1871-A and 1872-A have special construction to withstand extremely high pressures. Recommended for use on lubricated valves.

FLUSH TYPE FITTINGS

Model No.	A	B	C	D	E
†Z-730-A	7/16"	3/8"	.....	5/16"	.....
Z-741-A	9/16"	15/32"	29/64"	35/64"	1/4" P.T.
1452	1/2"	29/64"	1/16"	13/32"	1/8" P.T.
†1814	21/64"	9/32"	.....	5/16"	.....
1815	23/64"	9/32"	9/32"	25/64"	1/8" P.T.
†1817	11/32"	19/64"	.....	5/16"	.....
†1853	11/32"	19/64"	.....	1/4"	.....

†Drive Fittings.

GIANT FLUSH TYPE FITTINGS

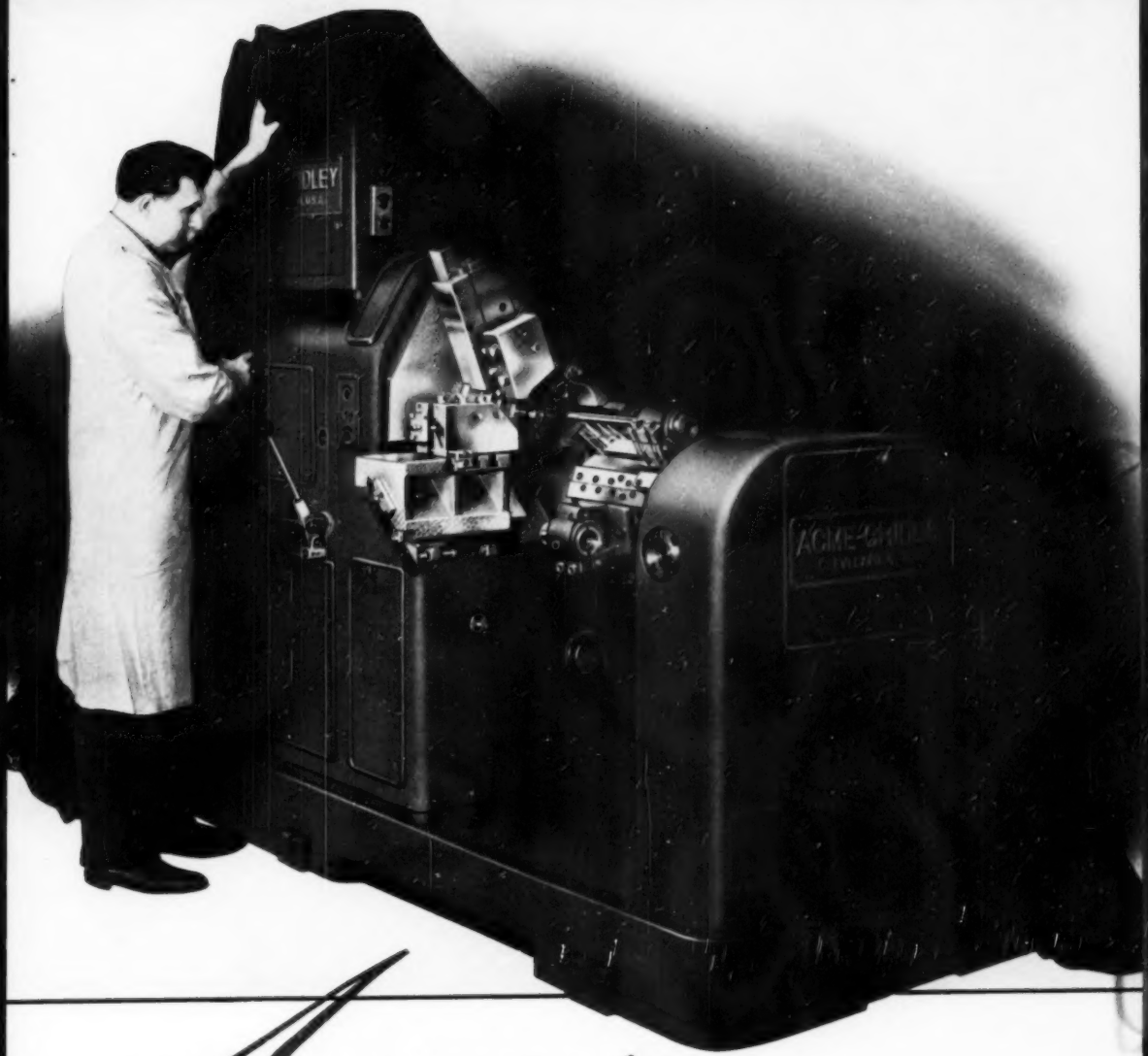
Model No.	A	B	C	D	E	F*
1840	49/64"	39/64"	31/64"	5/8"	5/16"-11 Thread	3/8"
1841	49/64"	39/64"	31/64"	43/64"	3/8" P.T.	3/8"
1842	55/64"	39/64"	1/2"	27/32"	1/2" P.T.	7/16"
1843	7/8"	39/64"	1/2"	1 7/64"	3/4" P.T.	1 1/4"
1844	7/8"	5/8"	31/64"	1 1/16"	1" P.T.	1 1/4"
**1846	49/64"	19/32"	19/32"	1 7/64"	3/4" P.T.	1 1/16"
**1847	55/64"	39/64"	1/2"	27/32"	1/2" P.T.	7/16"

*Wrench Size. **Flush Fit No Hex.

ALEMITE
Modern Lubrication Methods That Cut Production Costs

FREE! Complete set of four Data Sheets similar to this, giving specifications on all types and sizes of Alemite Lubrication Fittings. Simply write to Alemite, Dept. D-20, 1850 Diversey Parkway, Chicago 14, Illinois.

Another Product of STEWART WARNER



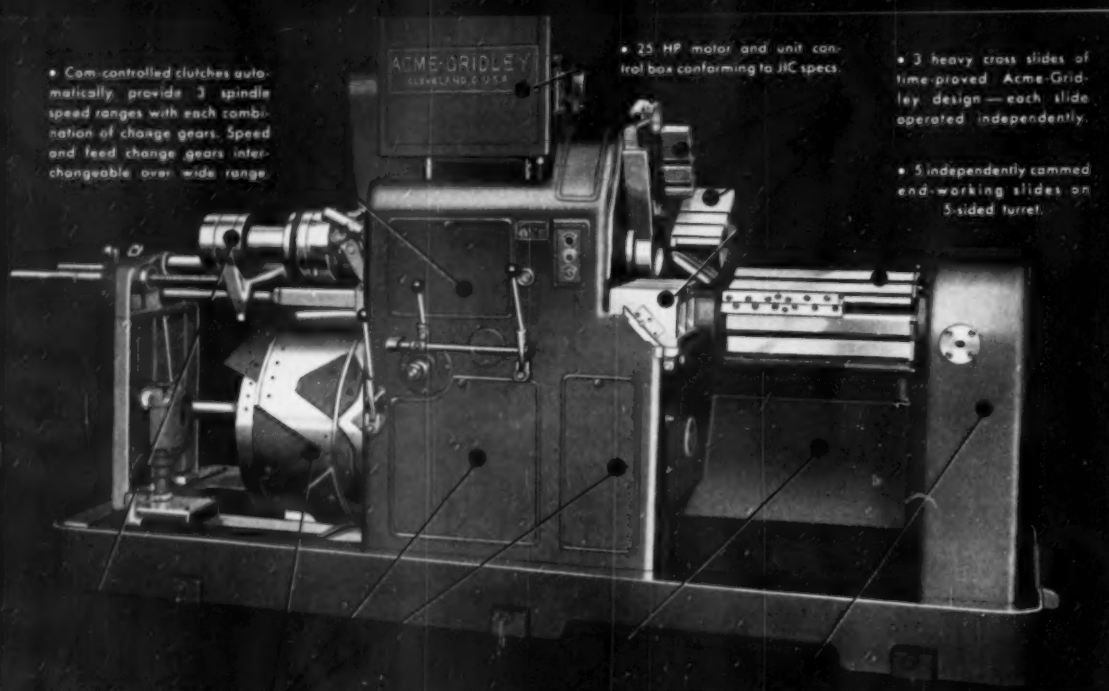
Announcing

THE FASTEST... MOST ECONOMICAL

SINGLE SPINDLE BAR AUTOMATIC

IN SIZES 2⅝", 3½", 4¾" AND 5⅛"

FOR DETAILS TURN PAGE



• Cam-controlled clutches automatically provide 3 spindle speed ranges with each combination of change gears. Speed and feed change gears interchangeable over wide range.

• 25 HP motor and unit control box conforming to JIC specs.

• 3 heavy cross slides of time-proved Acme-Gridley design — each slide operated independently.

• 5 independently cammed end-working slides on 5-sided turret.

• Positive, cam-controlled chucking mechanism and safety-type spring stock feed.

• Steel cams, easily accessible — require minimum change for any range of similar work.

• Wide, open tooling area with plenty of chip room — chip conveyor optional.

• Rugged outer turret support houses Geneva mechanism with separate motor for indexing turret independently of cross slide operation.

THE NEW ACME-GRIDLEY

MODEL "M" SINGLE SPINDLE BAR AUTOMATIC

offers

★ **SPEED** — Production up to 10 times faster — by actual test on customer jobs. Rugged doubly reinforced frame construction permits speeds and feeds required for carbide tooling.

★ **ECONOMY** — Complete freedom from gadgets and unneeded accessories permits an economical base price — matched by new economies on short or long run jobs.

★ **SIMPLICITY** — Fully automatic; wide, open tooling zone; simple camming, easy to tool, quick to retool — one man can operate several machines.

★ **ACCURACY** — Sustained close tolerances and fine finish at the fastest feeds and highest spindle speeds modern tools can take.

Clip this Coupon to your letterhead

THE NATIONAL ACME CO.
170 East 131st Street, Cleveland 8, Ohio

Send me your catalog on the NEW ACME-GRIDLEY MODEL "M" SINGLE SPINDLE AUTOMATIC as soon as it is off the press.

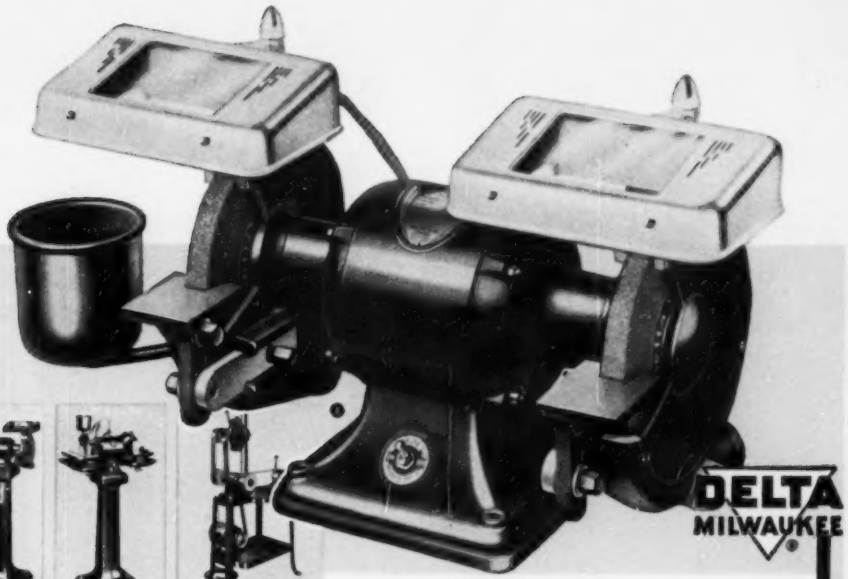
Name Title

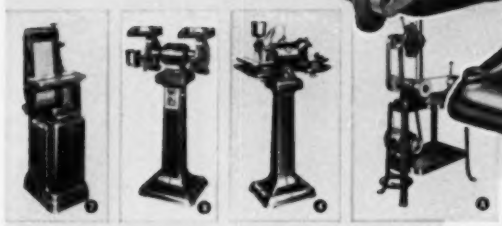
Company

Street Address

City Zone State

THE NATIONAL ACME CO.
170 EAST 131 STREET · CLEVELAND 8, OHIO





DELTA®—*the most complete line*

has a grinder with the current and speed you need — priced within your budget

Need a grinder for toolroom or production work? Delta's got the right one for your job — and at a price that's right, too! Delta is the industry's *most complete line* of metalworking and woodworking machines—and the only line with *complete, quality* accessories to make every machine more useful.

Actually, you'd expect to pay much more for the all-around *high quality* of these grinders. But at the moderate Delta price, you get typical quality features like these: Pre-loaded, lubricated-for-life ball bearings. Precision-bored bearing seats. Precision-ground spindles. Dynamic balancing of all parts that rotate at high speed. That's why you're absolutely sure of top value, when you buy Delta — know you can count on safety, accuracy, economy, and convenience that last.

So see Delta *first*, when you need grinders — and any other metalworking or woodworking machines. Send coupon below for facts on every machine in the entire Delta line.

① Delta-Milwaukee Tool Grinder with Twin-Lite® Safety Shields (bench model).....$ 95.00
② Delta-Milwaukee Abrasive Belt Finishing Machine.....$121.30
③ Delta-Milwaukee Tool Grinder with Twin-Lite® Safety Shields (floor model).....$114.00
④ Delta-Milwaukee Carbide Tool Grinder.....$154.00
⑤ Delta Belt Grinding, Polishing, and Deburring Machine....$130.75
⑥ Delta-Milwaukee Toolmaker® Surface Grinder.....$375.00
⑦ Delta-Milwaukee Toolmaker® Chip-Breaker Grinder.....$412.50
⑧ Delta-Milwaukee Toolmaker® Tool-and-Cutter Grinder....$425.00

Motor and switch extra in some cases.
Prices subject to change without notice.

See Delta First!

for the right machine for your job

53 MACHINES
246 Varieties

3 Band Saws | 6 Circular Saws | Scroll Saw | 4 Jointers | 11 Drill Presses

— plus 5 Grinders . . . 3 Welders . . . 2 Shapers . . . 4 Radial-Arm Saws . . . 2 Abrasive Finishing Machines . . . 3 Cut-Off Machines . . . Mortiser . . . Deburring Machine . . . Lathe . . . 2 Saw-Jointer Combinations . . . 2 Planers . . . 2 Buffing Machines

POWER TOOL DIVISION
Rockwell
Manufacturing Company
MILWAUKEE 1, WISCONSIN

DELTA • MULTIPLEX • CRESCENT • HOMECRAFT
Sold only through authorized dealers — easy time payments available.

Look for the name of your Delta dealer under "Tools" in the classified section of your telephone directory.

Tear out coupon and mail today!

Power Tool Division
Rockwell Manufacturing Co.
6088 E. Vienna Ave., Milwaukee 1, Wis.
Send me free catalogs and Bulletins on the complete Delta line.

Name.....
Title.....
Company.....
Address.....
City.....(....) State.....

M-45

Men Responsible for

NIAGARA AMERICA'S

PRESSES, SHEARS, MACHINES

NIAGARA MACHINE AND TOOL WORKS,

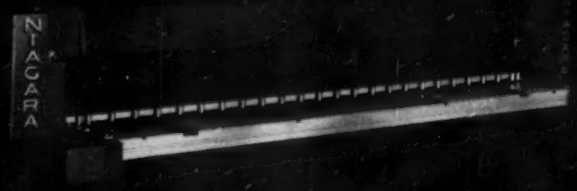
PRODUCTION *depend on*

MOST COMPLETE LINE OF

AND TOOLS

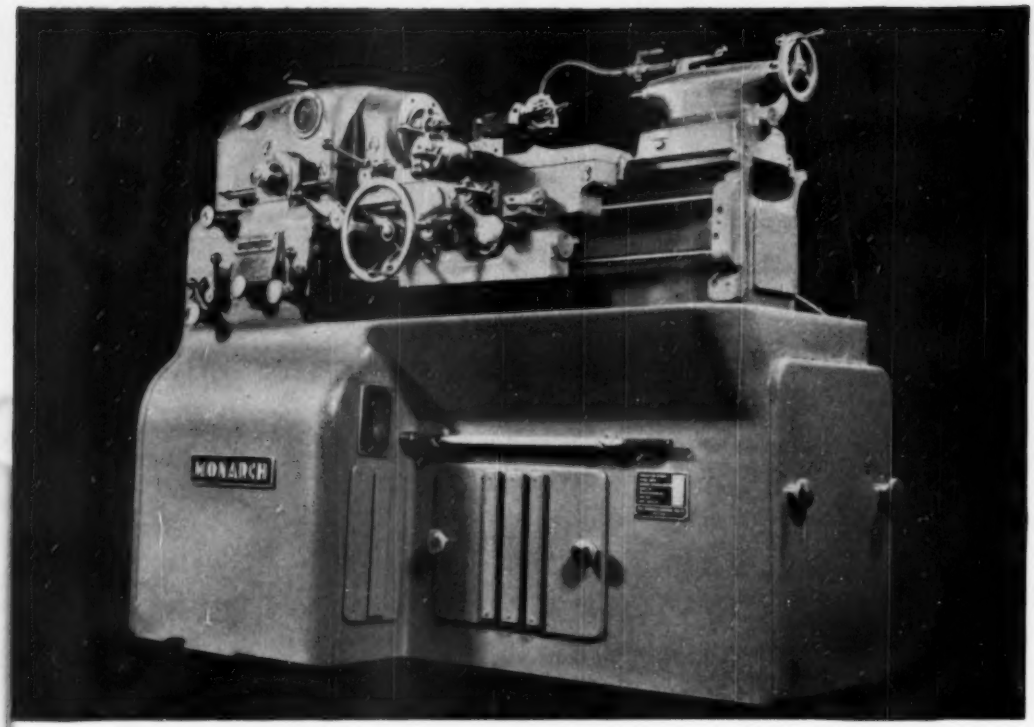
FOR PLATE AND SHEET METAL WORK

● Foremost manufacturers throughout industry are increasing output and cutting costs with Niagara Machines. Every man responsible for production of component parts and finished products involving shearing, blanking and forming of plate and sheet metal are finding a Niagara Shear, Press or other type of machine well suited to his requirements. Write for data on the complete range of sizes and capacities.



BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK



BETTER THAN EVER!

MONARCH'S FAMOUS 10" EE TOOLMAKER'S LATHE

For sensitive precision in the toolroom, no other lathe manufacturer offers a machine with so many exclusive design and construction advantages. These three are typical:

1. *Infinite range of speed changes, ratio 1:100.* No shift, no back-gearing—only rheostat control required for stepless ranges as high as 40-4000 R.P.M. Through a built-in speed reducer this high range may be reduced to 6.5-650 R.P.M.

2. *Variable rapid traverse return* at end of threading cut is available (as original equipment) in connection with electric leadscrew reverse. Rheostat is preset to accelerate return of tool, reducing threading time as much as 50%.

3. *Flame-Hardened, ground bed ways.* By this time-proved Monarch process the wear-resisting qualities of steel are blended in, integral with the rugged cast iron base—for greater accuracy and longer life.

Considerably more than 5,000 Monarch 10" EE Sensitive Precision Toolmaker's Lathes are now in use. Such unparalleled customer endorsement of the basic superiority of Monarch's design, progressively improved since the original introduction of the first EE, is proof that Monarch is your best buy in a precision toolmaker's lathe. For complete details, ask for booklet No. 302.

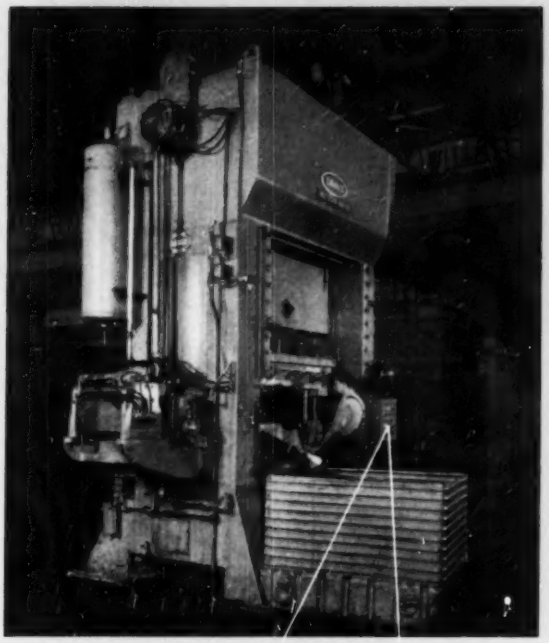
THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE
Monarch TURNING MACHINES

FOR A GOOD TURN *FASTER* — TURN TO MONARCH

50% LONGER DIE LIFE ON THIS

DANLY
autofeed



Higher speed of this DANLY AUTOFEED PRESS made a 50% increase in die life possible!

50,000 parking lamp mounting brackets stamped before die change!

Presses work hard in this large automotive plant . . . shift averages up to 7500 pieces are achieved on this Danly Autofeed! Notching, flanging, trimming, piercing and cut off operations are performed on each stroke of the press.

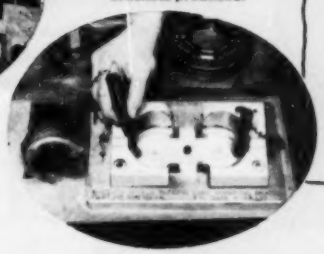
Variable and higher speed of the Danly Autofeed Press on this job is the key factor in making this remarkable die life improvement possible. Experimentation with various operating rates showed that higher speeds meant 50% longer die life. Higher speeds are possible with Danly Autofeed Presses because of heavier construction and greater resistance to vibration and deflection.

But this significant advantage is only one of the cost reducing features of Danly Autofeed Presses. For another, the new Danly cool-running clutch greatly reduces the most important single item of press operating cost, clutch maintenance.

Danly Autofeed Presses are available from 50 to 800 tons, offering the advantages of automatic feeding over a greatly expanded tonnage range.

Close up of the die setup. Two finished pieces, one right and one left, are produced per stroke.

View of inspection operation showing precision gaging of the parking lamp mounting brackets produced.



SEND FOR THIS FREE BOOKLET

And see how DANLY AUTOFEED PRESSES are certain to reduce stamping costs in your plant!

CHECK THESE

EXCLUSIVE *DANLY* PRESS FEATURES

- ✔ cool-running clutch
- ✔ extra rigidity
- ✔ complete pressure lubrication
- ✔ special controls—sensitive reaction
- ✔ precision construction

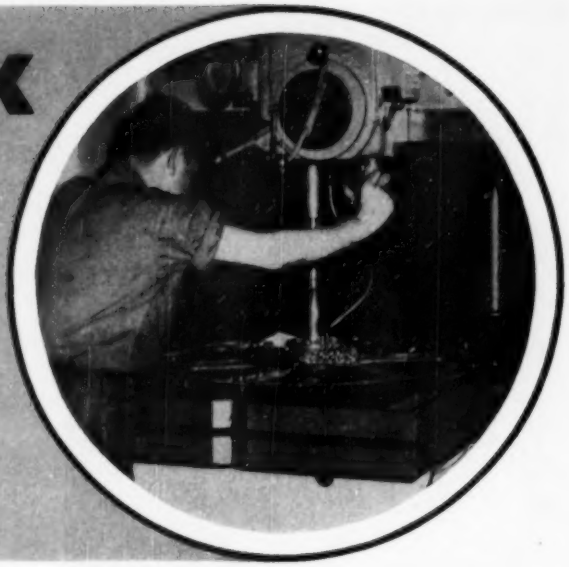
Danly Machine Specialties, Inc., 2100 South 52nd Avenue, Chicago 50, Illinois

DANLY

MECHANICAL PRESSES...50 TO 3000 TONS

FOSDICK SENSITIVE RADIAL DRILL

Increases the range of Sensitive work



● The advent of this extremely flexible machine has opened a new and wider field for sensitive drilling work.

It is very much like a conventional radial except that it has the arm at a fixed height from the base and also features an adjustable table on the column. Both the arm and the table swing in an arc of 360°. There are many advantages to this adjustable table design—table is always in proper position for work being handled—the work can always be close to head with minimum spindle extension—the table can easily be swung out of the way to handle a tall work piece mounted on the base.

There are two ranges of spindle feeds (high)—from .004 to .020 and (low)—from .002 to .010. Spindle speeds are available in 6 combinations ranging from 60 to 1200 up to 175 to 3500.

The machine finds many uses both in large and small plants due to its adaptability to such a wide range of sensitive drilling operations and the flexibility of its radial design.

The machine shown is operating in the plant of the Slocomb Corporation, Wilmington, Del.

For full details write for Fosdick Sensitive Radial Bulletin S R A.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

Announcing the entirely new HYSTER 20

better in every way...

- **NEW** improved Wisconsin *Air Cooled Engine.* Efficient in *any temperature,* high or low. Greater H.P. than other 2000 pound trucks. Power to spare yet *cheaper to run.*
- **NEW,** long life, heavy duty Borg & Beck *Clutch.* Smooth as your automobile clutch. Estimated life over 2 times greater than other trucks. *It can be replaced in less than two hours.*
- **PNEUMATIC TIRES** — Big diameter, 10-ply rating (6.00x9).
- **SINGLE LEVER CONTROL** — one lever for hoisting, tilting.
- **LOW OVERALL HEIGHT** — truck with 9-foot lift only 78½ inches high. Other lift heights available.
- **EXTREMELY LOW OPERATING COSTS.** Almost 100 *new* mechanical improvements.

...Now on display at Hyster Distributors in all principal cities

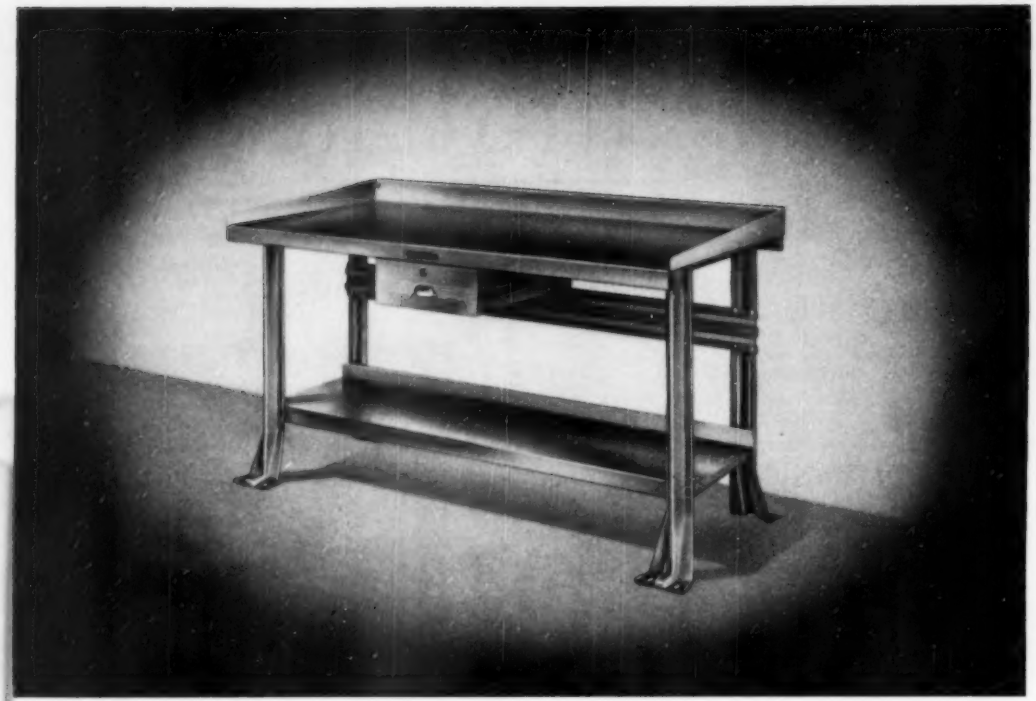
HYSTER®
COMPANY
THREE FACTORIES
2902-14 N. E. Clackamas, Portland 8, Ore.
1802-14 North Adams... Peoria 1, Illinois
1010-14 Meyers Street... Danville, Illinois

the first completely modern 2000 pound Lift Truck

Designed by Materials Handling Engineers. Priced right, low maintenance costs, standardized repair procedures, low depreciation.

Operates equally as well inside or outside your plant. Low center of gravity, better visibility; EASIER ON FLOOR SURFACES, THE OPERATOR, AND ON LOADS.

THOUSANDS of HYSTER 20 trucks are in use in HUNDREDS of INDUSTRIES. NOW the New Hyster 20 Lift Truck can cut materials handling costs even more. SEE IT at your nearest HYSTER DISTRIBUTOR. While you are there, inspect his SERVICE facilities.



The HALLOWELL WORK BENCH OF STEEL

Standardized, *ready-made* HALLOWELL Work Benches save trouble and expense of "building your own"; provide superior equipment for maximum productivity.

Interchangeable units readily adaptable to individual requirement. Easily bolted together to form continuous bench, yet may be taken down and reassembled as single units. Rigid, heavy-duty construction eliminates bolting to the floor, minimizes installation and maintenance.

HALLOWELL Work Benches do credit to any plant. Functional design and attractive appearance encourage better plant housekeeping and worker performance.

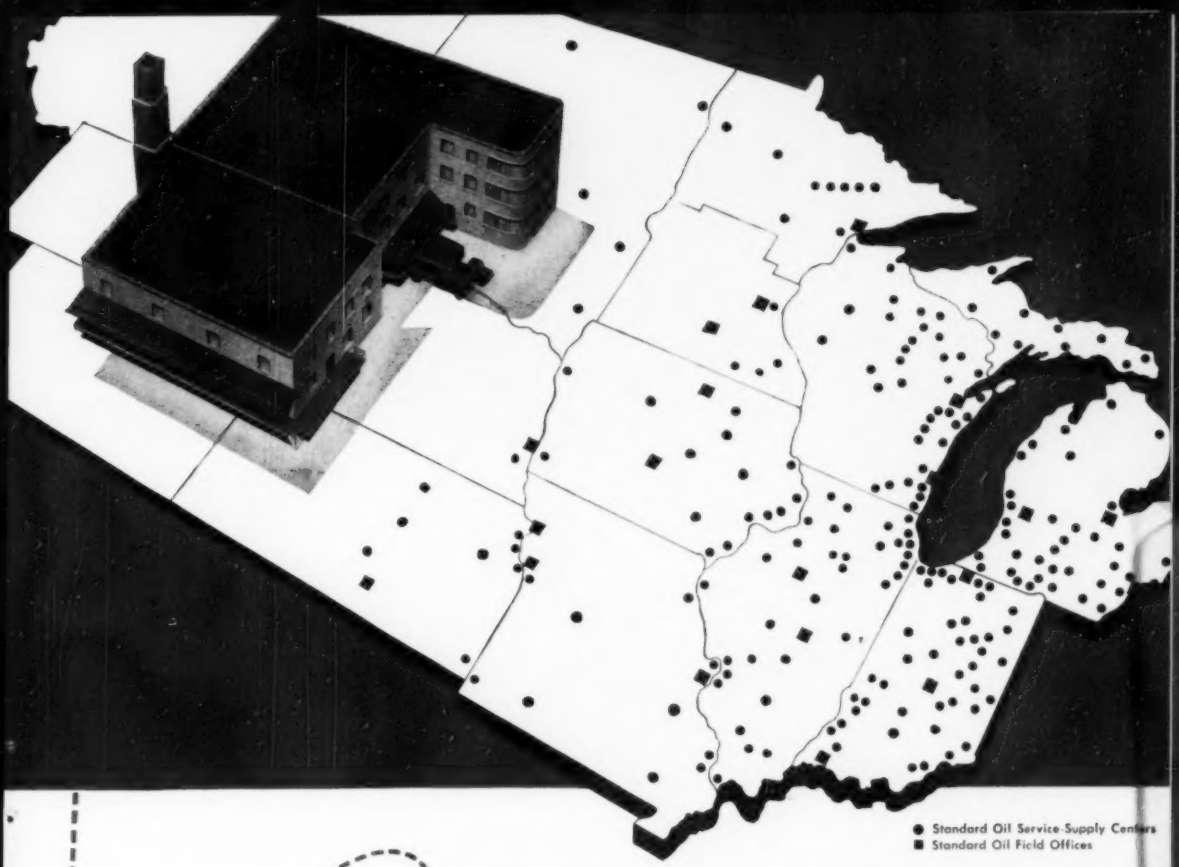
Full details in Bulletin 701.

Work Benches
Tool Stands
Foreman's Desks
Platform Trucks

HALLOWELL
SHOP EQUIPMENT OF STEEL

Posture Stools
Posture Chairs
Cabinets
Folding Tables

SPS STANDARD PRESSED STEEL CO.
JENKINTOWN 1, PENNSYLVANIA



Right in your own back yard!

● If your plant is in the Midwest, you can benefit from a service-distribution set-up that is unique in the oil industry – there's a Standard Oil office and warehouse practically right in your own back yard. The nearness of that service-supply center holds important advantages for you.

Faster Deliveries. You needn't worry about production delays caused by late shipments of necessary lubricants and fuels. You can avoid the expense and trouble of stocking large quantities of lubricants and fuels within your plant.

A Complete Supply. Every lubricant and fuel necessary to the efficient operation of your plant will be carried in the warehouse at your nearby Standard Oil service-supply center. You can always get the product you need *when* you need it.

On-the-Spot Engineering Service. Your nearby Standard Oil service-supply center is headquarters for a Standard Oil Lubrication Specialist who is assigned to your plant. He is close at hand to give you help when you need it. He has plenty of practical experience. He has been specially trained for his job in a Standard Oil Lubrication Engineering School. He is backed by Standard Oil's extensive research and technical facilities.

To arrange for his visit, phone your nearby Standard Oil service-supply center or write to: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

3 IMPORTANT ADVANTAGES

Standard Oil's Lubrication Service is especially geared to serve your midwest operations.

1 **Service-supply points** are near your plant. You are assured of fast deliveries, prompt lubrication engineering service.

2 **Lubrication specialists** have been specifically trained in Standard Oil Lubrication Engineering Schools to help you obtain the maximum benefits from lubricants and fuels.

3 **Research and technical facilities** are geared to help solve your specific lubrication problems.

STANDARD OIL COMPANY (INDIANA)

STANDARD

What's YOUR problem?

R. L. Jenkins, lubricating specialist at Standard Oil's South Bend office solved this customer's problem because he was thoroughly familiar with job requirements and the application of his Stanorust line.

There is a corps of such lubricating specialists throughout the Midwest, trained and experienced to help plant operators solve similar prob'ems. Experience enables these men to find quickly the cause of lubricating troubles. Knowledge of petroleum products enables them to prescribe the lubricant needed. There is one of these lubricating specialists at the Standard Oil Company (Indiana) office near you. He is there to serve you. A call or a card will put him at your service.

Investigate the cost-saving possibilities of these lubricants.

STANOIL INDUSTRIAL OILS—for cleaner hydraulic systems, gear cases, compressors, and circulating systems.

CALUMET VISCOUS LUBRICANTS—adhere to open gears and chain drives without throw-off. Easy to apply. No heating.

STANOLITH GREASE—withstands high temperatures and resists washing by water.

THE SHOP FOREMAN of Hart Pressed Steel Corp., Elkhart, Indiana, exposes the clean metal surface beneath a coating of STANORUST 1-XC Rust Preventive by a simple wiping operation. The die shown has been protected against rust under severe outdoor conditions for over a year by STANORUST 1-XC.

How to prevent rust under severe outdoor storage . . .

RAIN, snow, heat, cold—plus coal soot from passing locomotives—could be expected to produce serious rust troubles in outside storage. The elements did, indeed, cause difficulties for the Hart Pressed Steel Corp., Elkhart, Indiana, which owns the truck and trailer dies shown above. Despite coatings of heavy oil, rusting was so severe that cleaning a die required at least three hours.

The problem was laid before a Standard Oil lubrication specialist. He pointed out that, to withstand severe outdoor exposure, a rust preventive with special qualities is needed. At his suggestion, the dies were coated with STANORUST 1-XC, a rust preventive especially developed for severe outdoor service.

Use of a STANORUST Rust Preventive has made savings for this company. Many of the dies have been exposed to the weather for over a year, yet STANORUST has kept them completely protected against rust. A die can now be cleaned and returned to service in a matter of ten minutes, as compared with the three hours previously required.

The new and improved STANORUSTS can mean big savings for you through more economical applications, better rust protection. There's a lubrication specialist near you who can help you get the most economical results. How you can obtain his services is described at left. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

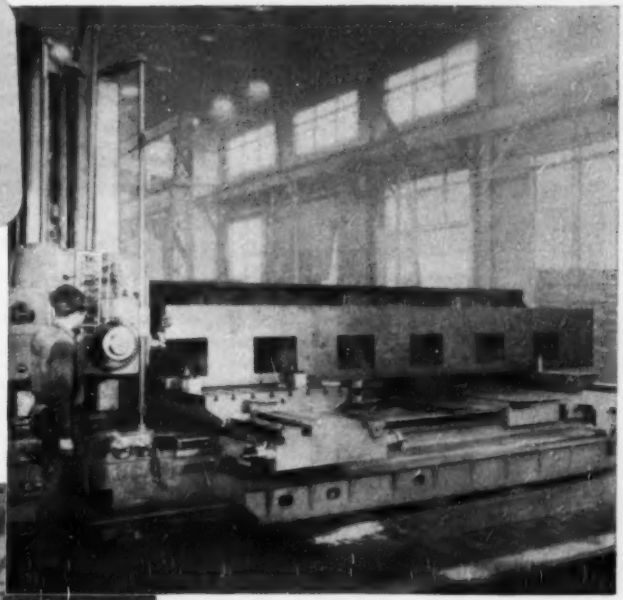
STANORUST
REG. U. S. PAT. OFF.
RUST PREVENTIVES

STANDARD OIL COMPANY (INDIANA) STANDARD

Precision tool room jobs, of course, but . . . . . .

How's a LUCAS on BIG work?

RIGHT — Lucas 5" spindle model with extra length bed, milling one end of the base casting for a large wire-drawing machine mounted on the main table and an auxiliary table. Notice, for example, how table overhang for long cross travel is supported by outer ways which are integral with the base casting.



BELOW — Lucas 5" spindle model boring the main (crankshaft) bearings of a 12 cylinder V-type Diesel Electric Locomotive crankcase.

Note the Electric Directional Control Pendant which can be swung and raised or lowered to the most convenient operating position.

These pictures tell the story. Lucas precision horizontal boring, drilling and milling machines are built big and heavy for heavy boring and milling operations on huge pieces.

The combination of high precision with great strength insures the accuracy required in jig and fixture work with the weight and strength for the heaviest duty, and makes a Lucas a true multi-purpose machine — usually the most used equipment in any shop.

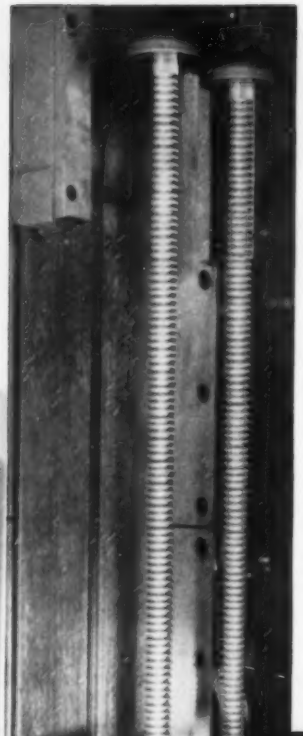
Built in 3", 4", 5" and 6" spindle models, all available with Automatic Power Positioning which eliminates jigs and fixtures and makes the horizontal boring machine a highly accurate production tool. Work ranges from 36" x 36" to 96" x 132" standard. All sizes furnished with either two-way or four-way beds. Write for descriptive literature.

LUCAS OF CLEVELAND

LUCAS

Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO



THE *American* WAY...

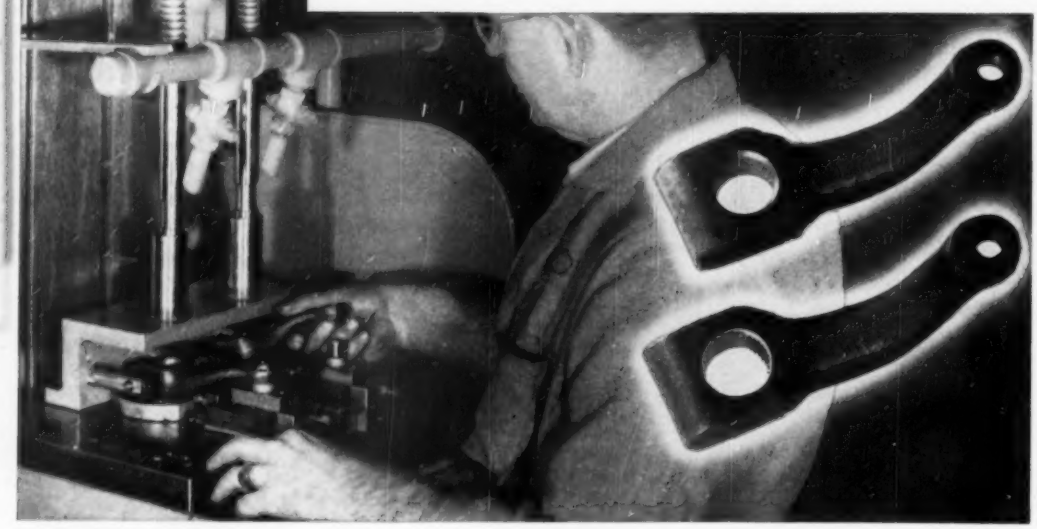
TO PUT "TEETH" IN STEERING ARMS

FASTER . . . AT LOWER COST

Two station fixture on a standard American broaching machine enables this manufacturer to broach 10 serrations in a segment of the steering arm hole and finish broach the hole in one pass. Location of the 10 serrations are maintained by index flats on the broach shanks. An economical, high-production rate of over 250 per hour was attained on an American T-10-36 vertical hydraulic broaching machine, with hydraulically operated, manually controlled broach retriever . . . arranged for two station pull-down broaching. The fixture holds one part at each station completing two parts at each stroke of the ram. Two hand manual control assures absolute operator safety.

Versatile Three-way Machines Achieve Overall Economy

Economical, high-production rates are easily attained on American type T, three-way broaching machines. Designed for inexpensive adaptation to push, pull or surface broaching, with single or multiple tooling of the ram, these three-way machines provide for low-cost conversion as production requirements change. American Engineers will be glad to make their recommendations for your broaching production. Write giving hourly requirements and part sample or drawing. Circular 100 gives full information on three-way machines. Address Dept. A.



AMERICAN *American* BROACH & MACHINE CO.

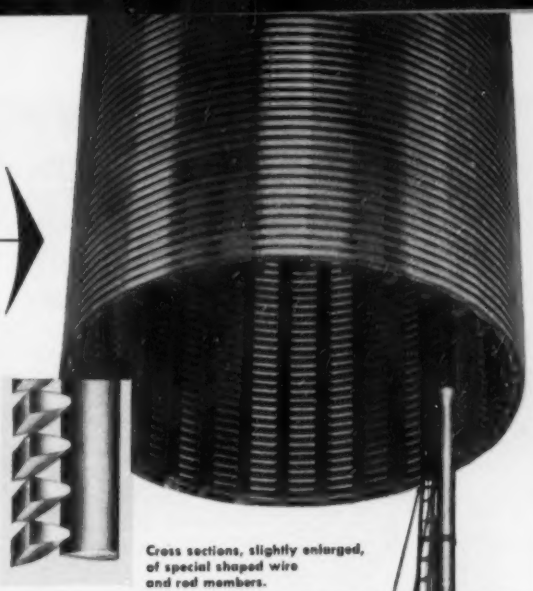
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery

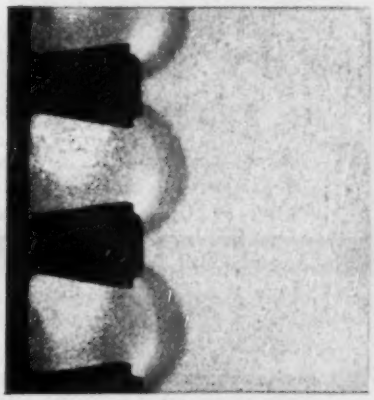
EVERDUR

Famous for exceptional resistance to corrosion, high strength, and adaptability to money-saving fabricating methods.



Cross sections, slightly enlarged, of special shaped wire and rod members.

Well screen being fabricated by unique method of resistance welding.



Micrograph of lengthwise section showing excellent fusion of Everdur resistance welds.

Johnson Well Screen, 16" O. D., 35' long, being lowered into well casing.

Longitudinal rods and outer wire in this Edward E. Johnson, Inc., well screen are both Everdur* 1010 and of special cross section. Fabrication of the screen is quickly and economically accomplished by rotating the rod assembly, thus winding on the wire and automatically welding wire to rod by electrical contact.

The circuit is arranged so that the rod assembly becomes one electrode, the other electrode being a copper roll which rides on the wire. As the latter touches each rod a surge of current welds the wire to the rod. Welding is at the rate of from 900 to 1700 welds per minute, depending on the size of the wire and rod. Only two or three cycles of current are required for each weld.

Everdur Alloys are non-magnetic and highly resistant to fatigue. Alloys are available which can be machined, hot-forged, drawn, stamped, spun, cast, electric-welded or oxy-acetylene-welded by all modern methods and equipment. For detailed information regarding compositions, properties, applications and advantages, ask for Publication E-5. Our Technical Department is at your service. Write The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 69166

* Reg. U. S. Pat. Off.

Where corrosion resistance counts— consider Everdur

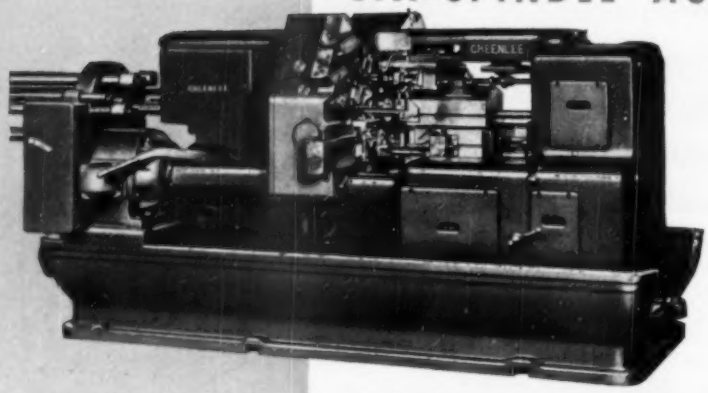
ANACONDA

COPPER-SILICON ALLOYS

RUGGED, COMPACT, EFFICIENT

GREENLEE

SIX-SPINDLE AUTOMATICS



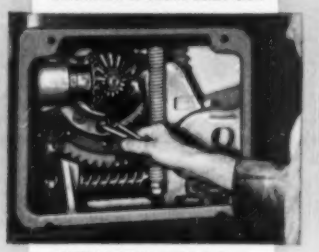
CUT COSTS *on all kinds of* JOB SHOP WORK

GREENLEE Automatic Screw Machines are rugged, compact, surprisingly simple in operation and maintenance, and unusually versatile. *Check these time-saving and cost-cutting features.*

CHANGING A CROSS SLIDE CAM

INTERCHANGEABLE CROSS SLIDE CAMMING

All six cross slide cams can be replaced in less than 6 minutes, and only 15 cams handle 90% of the average job-shop requirements.



SETTING TOOL SLIDE STROKE

STANDARDIZED TOOLING SPEEDS SET-UPS

With identically machined tool cavities and interchangeable tool holders, Greenlee Automatics make quick job changes a cinch. You save in equipment costs, too!

A SIMPLE ADJUSTMENT SETS THE STROKE

A graduated worm wheel permits an accurate setting of the tool slide stroke in a simple, easy operation without guesswork, fuss, or bother.

A ROOMY TOOLING AREA HELPS OPERATORS

There's plenty of elbow room in the tooling area, making it easy for operators to accurately position tools and attachments for best results.

GREENLEE

WRITE TODAY... and let us send you our 20-page book on Greenlee Automatics. Ask for Screw Machine literature.

GREENLEE BROS. & CO.
1722 MASON AVE., ROCKFORD, ILL.

DRILLING, BORING, TAPPING MACHINES • SCREW MACHINES • TRANSFER PROCESSING MACHINES

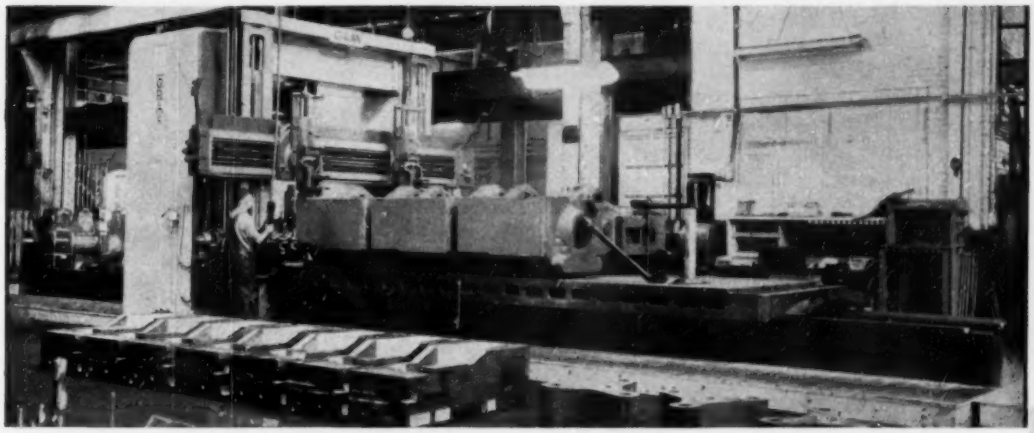


Photo courtesy Waterbury-Farrel Foundry & Machine Co.

The GRAY PLANER-

developed to effectively utilize cost-cutting carbide tools. High Speed combined with highest precision, cuts hours from planer time — cuts dollars from production costs. Can you compete?

The GRAY PLANER TIME CALCULATOR-

developed to quickly and accurately estimate machining time for modern planers equipped with high speed, variable voltage drives. The first of its kind—now available (all vinylite construction) at $2.00 each, including case.

The G.A. **GRAY** *Company*

planers • milling planers • planer type milling machine horizontal boring machines

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD.

SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

CLIP AND MAIL TODAY

The G. A. Gray Co., Dept. A
Cincinnati, Ohio

Please send me _____ of the new GRAY PLANER TIME CALCULATOR. $2.00 enclosed.

Name _____

Title _____

Company _____

Address _____

OK TOOL CO. mov

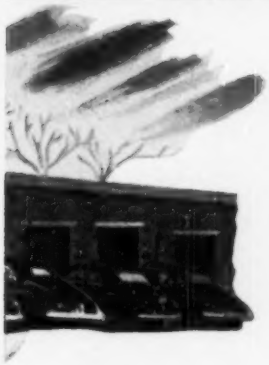
DIVISION WILLIAMS

ALL DEPARTMENT HEADS AND KEY PERSONNEL REMAIN INTACT

W. J. CRABTREE	R. S. YOUNG	R. W. GREYWACZ	F. R. SANFORD	G. O. WARD
Chief Engr. & Sales Mgr. with O K 25 years	Metallurgist with O K 25 years	Chief Designer with O K 20 years	Purchasing Agent with O K 21 years	Chief Order Manager with O K 7 years

es to WILTON, New Hampshire

AND HUSSEY MACHINE COMPANY, INC.



THURSTON WILLIAMS

FORREST HUSSEY

IMPORTANT MESSAGE TO USERS OF OK TOOLS

- The manufacture of OK inserted blade milling cutters, face mills, end mills, single point tools, and multiple operation tools was transferred from Shelton, Connecticut to Wilton, New Hampshire on January 27, 1950.
- Production started at Wilton late last year, and is progressing rapidly.
- OK Tool Company retains its identity . . . All key personnel, engineering and sales staff move without change, as do all sales distributors.
- Company now occupies three one and two-story buildings. $200,000 have been invested in new equipment in addition to excellent present facilities. Thurston Williams and Forrest Hussey are the sole owners and operators.

Address all correspondence to:

THE OK TOOL COMPANY

Division Williams and Hussey Machine Company, Inc.

WILTON, NEW HAMPSHIRE

OK TOOL DIRECT FACTORY SALESMEN

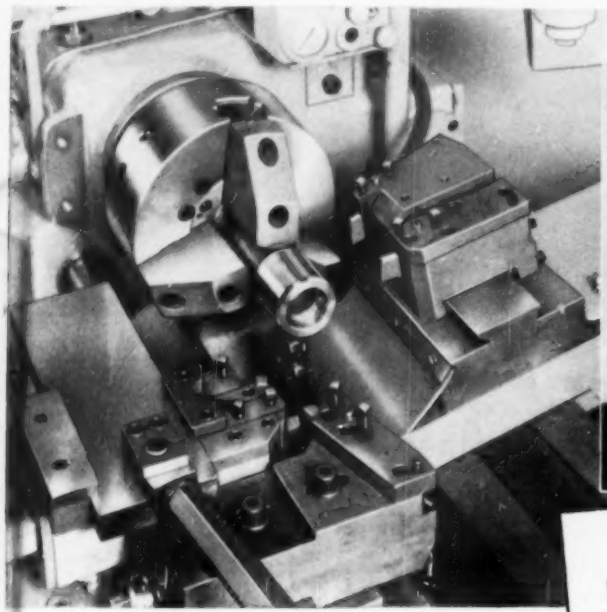
W. N. BURNS	W. C. WOOD	D. W. BRISTOL	C. J. GLUCK	J. H. KOBELENZ
H. E. SCOVIL	H. E. FRENCH	HAL GILLER	FRANK GAYNOR	F. J. CARTWRIGHT

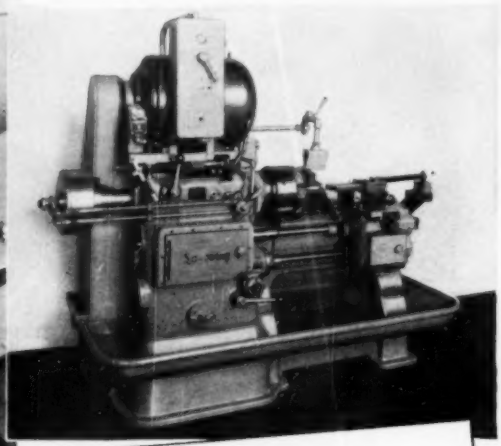
OK TOOL DISTRIBUTORS

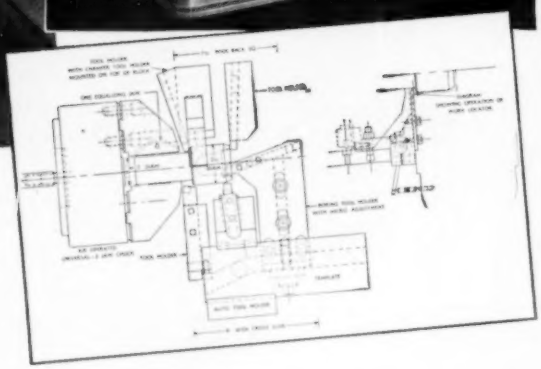
A. C. Pletz Company
Muskegon Hardware & Supply Co.
Crown Equipment Co.
Rickert Industrial Supply Co.
Paul F. Hermann Co.
Harry Dunn Corp.
W. R. Matthews Machinery & Tool Supply Co.
Sam Penny
Martin & Prestegaard Co.
John L. Barnard
Chandler Machinery Co.
Deaderick Machinery Co.
McVoy Hausman Co.
W. C. Chapman & Son
Dixie Mill Supply Co.
Rudel Machinery Co., Ltd.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK







Lo-swing CUTS COSTS ON CHUCK WORK

Problem: To turn and chamfer outside diameter, face both ends and bore inside diameter of Idler Shafts in a single automatic operation.

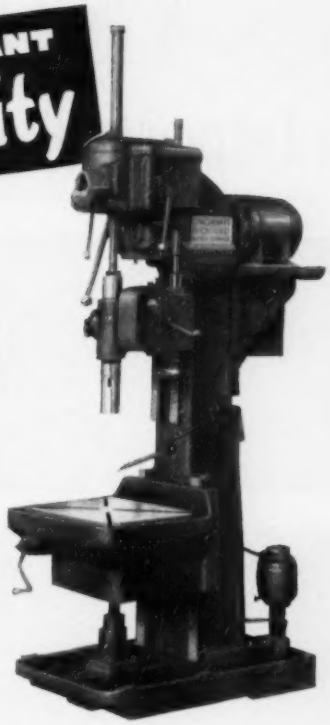
Solution: The Model LR Automatic Lo-swing Lathe selected for this job was equipped with a 10" three-jaw, air-operated chuck having one jaw fitted with a swivel key to compensate for irregularities on the forged stem. The large diameter is turned and the bevel generated with two tools mounted on the front slide which also carries the adjustable boring tool holder and tool. Both ends are faced to length and the inside face chamfered with three tools mounted on the automatic back facing attachment. Line drawing shows work locator which is automatically shifted to locating position when machine stops and automatically relieves when machine is started. Operation is entirely automatic. Operator simply loads and unloads chuck and pushes starting lever. Machining time is 39 seconds, floor to floor.

Engineered jobs are our specialty. Our staff is at your disposal to assist in solving your problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

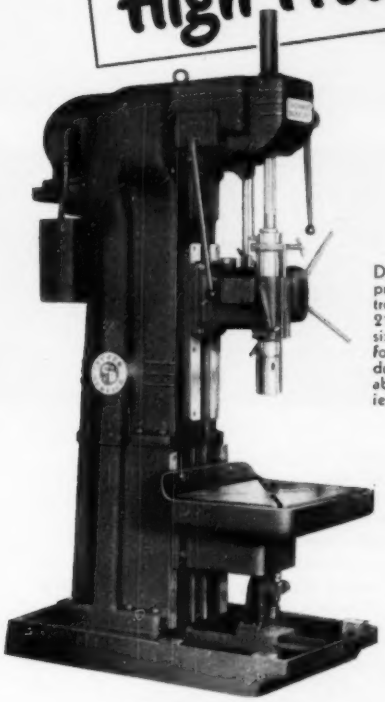
PRODUCTION COSTS ARE LOWER WITH Lo-swing

WHEN YOU WANT Versatility



All geared, sturdy, accurate and versatile, furnished in 21", 24", 28" sizes. Built in both box type and round type to suit the particular need.

WHEN YOU WANT High Production



Direct Drive, with push button control of motor—in 21", 24" or 28" sizes. Simplified for low cost production, yet adaptable and convenient.

Opportunity of selection means increased value to the buyer—the power to select exactly the machine suited to the particular job.

Cincinnati Super Service Upright Drills are built in production, and all geared types—one for high production, and on the other, versatility of performance.

Both types of these modern, up-to-date upright drills are sturdy, fast and rigid. They give long, trouble-free performance, and assure the user "low cost per hole."

Write for bulletin U-27 (Direct Drive Production Super Service Uprights) and bulletin U-25 (All Geared Super Service Uprights).

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE

Radials 7½" dia. col., 2½' arm, to 56" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.

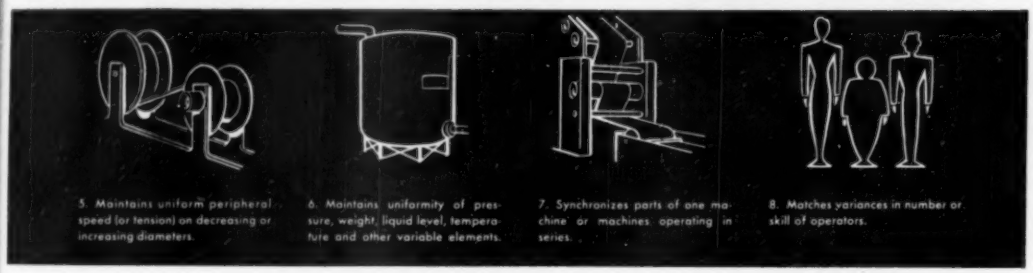
8 Ways Reeves Speed Control Increases Production–Improves Quality

1. Widens the work range of machines to handle more shapes, sizes, materials.

2. Accurately controls heating, baking, drying, cooking or chilling time.

3. Compensates for changes in consistency, density or viscosity of materials in process.

4. Regulates conveyor speeds—even to fractions of an inch per minute.



5. Maintains uniform peripheral speed (or tension) on decreasing or increasing diameters.

6. Maintains uniformity of pressure, weight, liquid level, temperature and other variable elements.

7. Synchronizes parts of one machine or machines operating in series.

8. Matches variances in number or skill of operators.

Here's the tested and proved way to get instant, stepless speed adjustability on your machines—assuring exactly the right speed for every job, under every changing condition.

REEVES Speed Control is standard equipment on more than 2,100 different makes of machines and is easily applied to your existing machines. Units are available in the widest variety of types, sizes, capacities and speed ratios with manual, push button or automatic control.

It's the positive answer to improved quality, higher production and lower manufacturing cost. Our experienced Speed Control Engineers will be glad to help solve your problems. Write today for the new catalog A30-3N.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

Accurate Variable

REEVES Speed Control

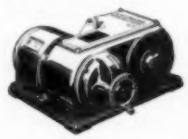
Gives the Right Speed for Every Job!

THE THREE BASIC REEVES SPEED CONTROL UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 15 hp.

MOTODRIVE combines motor, speed varying mechanism and reduction gears in single compact unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 15 hp.



SPOT NEWS OF METALWORKING

Union is supporting sweeping machinery modernization program put into effect by New England metalworking company which reduces number of machines from 4000 to 3000 (including many new ones). Work force is cut from 5700 to 3200, with no decline in output.

Ford of England has asked ECA to approve $2 million expenditure for machine tools in U. S. for new car retooling program. Company already has ordered in this country $2.5 million of machine tools. Of the total of $4.5 million being spent here through ECA financing, $2.4 is for passenger cars and remainder for truck and tractor engines and for tractor No. 5035.

New labor contract without pensions has been agreed to by one of the large automotive parts companies. Moreover, pension discussions are barred the next 2½ years. Improved insurance set-up is included in contract, which forbids further insurance talks for 4½ years.

Sign of German recovery: Adam Opel A. G., General Motors subsidiary, is getting from within western Germany all the materials and components needed for production of Opel cars that were obtained in Germany before the war. Export sales are expanding.

Bill to legalize basing point pricing is under fire from AFL, CIO, Farmers Union, National Grange and American Retail Federation. Charges are: bill is harmful to regional industrial development in south and west, and is attempt to lift ban on price discrimination.

Prominent maker of electric drills and other hand tools will announce shortly a new line of high-cycle and pneumatic tools. This is taken as proof of growing interest in high-cycle power.

Furnace has been developed in an eastern laboratory which melts aluminum at temperature of 5,500 F. Experiment is in the hush-hush stage.

A magnetic ceramic is being used instead of laminated steel to cut cost and size of transformers in television set made by an eastern company. The ceramic has the same permeability and eddy current characteristics of the replaced steel.

New "pushbutton" warehousing operation has been installed by prominent refrigerator maker for handling 470 refrigerators and 100 freezers per hour in a highly conveyorized setup. Operator of control station routes units to any one of ten lines off the main circuit for loading or storage.

Fiat reports that agreement to furnish motors for new Nash small car will work out if Nash gets orders for 100,000. British Standard Car Co. has withdrawn its engine offer to Nash. It was in competition with Fiat.

30-hp agricultural tractor will be built in Brazil by Maquinas Agricolas Romi Ltda. at Santa Barbara d'Oeste at rate of 50 units a month beginning in May. Four-cylinder motor, gears and some special steels will be imported, but 80% of material in tractor will originate in Brazil. Plant is equipped to turn out 2000 units a year.

500 to 700 fpm cutting speeds have been attained in production milling of cast iron, compared with the conventional top-limit near 300 fpm. Tool life is improved over that at lower speeds, providing chip load is maintained at 0.015 to 0.020 in. per tooth. Carbide-tipped cutters were used.

Schneider of France, large French heavy-goods producer (including armament), is planning to spend $2 million for American machine tools with ECA blessing. Most of new equipment will go to two of Schneider's factories.

Gaging Metalworking

The stringency of the coal situation is the most immediate worry of the metalworking industries. Some of the steel companies are faced by serious curtailment of operations this month, and many steel users report the necessity for drastic cuts in schedules or complete shutdowns next month unless coal is made available very soon.

If it were not for the critical coal shortage, the metalworking outlook would be bright. Even so, it is reasonably good. The strike at Chrysler is taking its toll of automobile output this month, reducing considerably what otherwise would be a near-record volume.

Industrial machinery sales and production are looking up. Both domestic and export demand is active.

Reconversion Deals Common

Because of the tightening market and scarcity of supply of sheet and strip, reconversion deals are again common. Cold-rolled, low carbon sheet steel is expected to remain critical through April, although the hot-rolled sheet market is easing. Light gage galvanized sheets are also critical.

Most steel makers are refusing to accept orders for sheet and strip for the remainder of the first quarter as well as for second quarter delivery. A Cleveland order for 600 tons of 16-gage sheet is going begging. Similar conditions are reported in Chicago, although overpriced steel can be had there by those willing to pay the price.

► Republic has already suspended iron making in two blast furnaces in Cleveland, one producing merchant pig, the other basic pig. Coke-making has also been cut. Only a quick end to the coal strike will prevent drastic curtailment of the company's operations.

Stampers Short on Steel

Chrysler Corp., by continuing to accept shipments of sheet and strip steel, blasted hopes of numerous stampers who had expected to pick up the tonnage going to that manufacturer. This leaves stampers as short of sheet and strip as they were immediately after the end of the steel strike.

► Most severe headache to the stampers at present is in making their customers understand that the recent increase in the price of steel sheet was not $4 per ton as announced, but as much as 10% to 14% by the time the steel is laid down in the stamper's plant.

Such misunderstanding on the part of customers means an almost complete renegotiation of present contracts with the customer balking at the increase in price that stampers believe they must have for their products. Backlogs for the stamping industry are about eight weeks and rising.

Unemployment at Postwar Peak

Unemployment in January reached its postwar peak, but the figures do not reflect a sharp drop in business activity. At almost 4.5 million, the total of those without jobs was larger than at any time since the war. It was 1.8 million higher than a year ago. However, the number of people at work in industry and commerce was actually slightly higher than a year ago. It was higher in spite of the fact that industrial production a year ago was still close to its postwar peak.

The American Machinist Index of Metalworking Production in Jan. 1949 was at 240, compared to a preliminary estimate of about 210 in January of this year. The Federal Reserve Board Index of Industrial Production was at 191, compared to 176 in December. This continuing high employment in non-farm jobs is a favorable factor in the business outlook. The 1.8 million gain in unemployment in the last twelve months comes from a drop of more than half a million in farm unemployment.

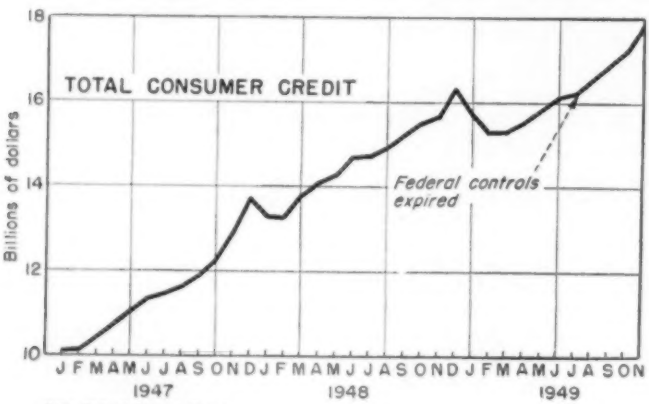
Consumer Credit at New High

Consumer credit advanced to a new all-time high in November, totaling $17,823,000,000, as shown in the chart below. Although this is high in dollar value, it is equal to only 9% of consumer disposable income (income after taxes). In past periods — 1941, for instance — consumer credit reached 11% of disposable income. But if the rise continues, it will reach the danger point some time this year. Some observers think the consumer credit bubble is already on the verge of bursting.

Tool and Die Business Good

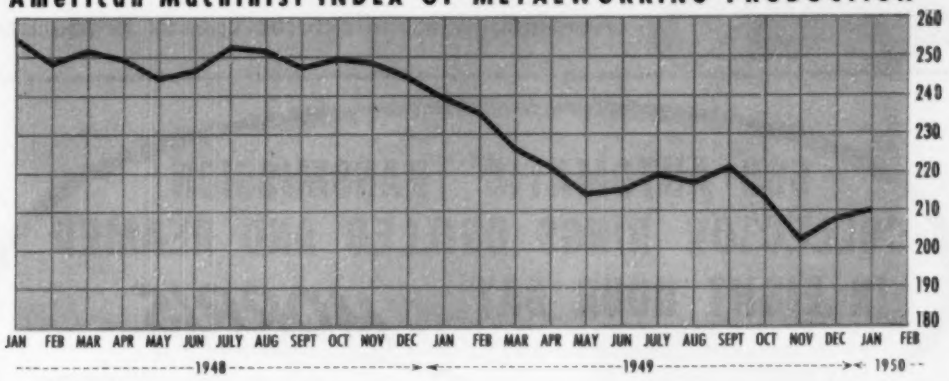
Contract shops in the New York City, Dayton and Chicago areas seem to have benefited most in the continuing improvement of the tool and die industry which extended through December. While December shipments were about the same as for November, their holding at that level was encouraging in view of the long, lean period experienced through most of last year.

CONSUMER CREDIT AT ALL-TIME HIGH


TOTAL CONSUMER CREDIT
Federal controls expired
Billions of dollars
18
16
14
12
10
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N
1947
1948
1949

Data: Federal Reserve Board

American Machinist INDEX OF METALWORKING PRODUCTION



INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
Jan. 1950 (estimated)	210					
Dec. 1949	208	186	232	195	229	227
Nov. 1949	203	187	233	165	226	223
Dec. 1948	245	247	266	203	258	262

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

While new orders received in Dec. 1949 were higher than the year's average, they failed to move the backlog, which has apparently stabilized at about 20% above the low point for the year reached last April and May.

Malleable Looking Up

The malleable founders industry saw a ray of hope for a market improvement in the recent placing of orders, however scattered and small, by makers of railroad equipment. Those orders were regarded in some quarters as the forerunner for others from that source. If so, the industry's present operation at 60% of the peak attained at the war's end will be bettered greatly.

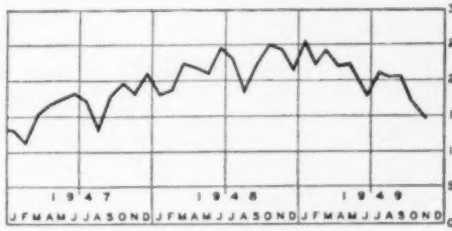
Production rate for the malleable iron industry continues to improve as the automobile and farm machinery makers remain active. One other factor—customer replacing of used-up inventory—is thought to be aiding in brightening the picture at this time.

European Buyers Active

Both domestic and export machine tool sales are reasonably active, with February proving to be a good month along with January. Citroen's purchases of U. S. tools, financed by ECA, will amount to $1,685,000, of which $1,100,000 will be spent in the current fiscal year and the remainder next year. Simca's equipment orders will total $2,941,000. Some $2,612,000 will be for machine tools, $1,239,000 for forging equipment, and $575,000 for body finishing machinery. Five French companies, including Citroen and Simca, are making an aggregate outlay of $7,886,000 sparked by ECA.

Ford of England placed orders for $1.25 million of U. S. machine tools prior to last November, an equal sum since Nov. 1, and has $2 million ready to allocate.

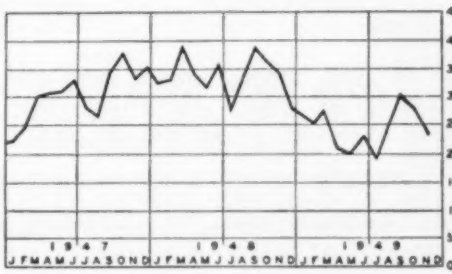
MAJOR APPLIANCE OUTPUT DOWN



Electric Household Refrigerators

Nov. 1949—147
Oct. 1949—168
Nov. 1948—245

(All indexes based on Avg. Mo. 1936=100)

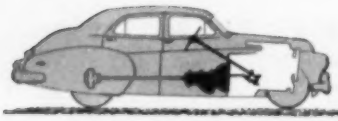


Major Electric Appliances

(exclusive of electric refrigerators)

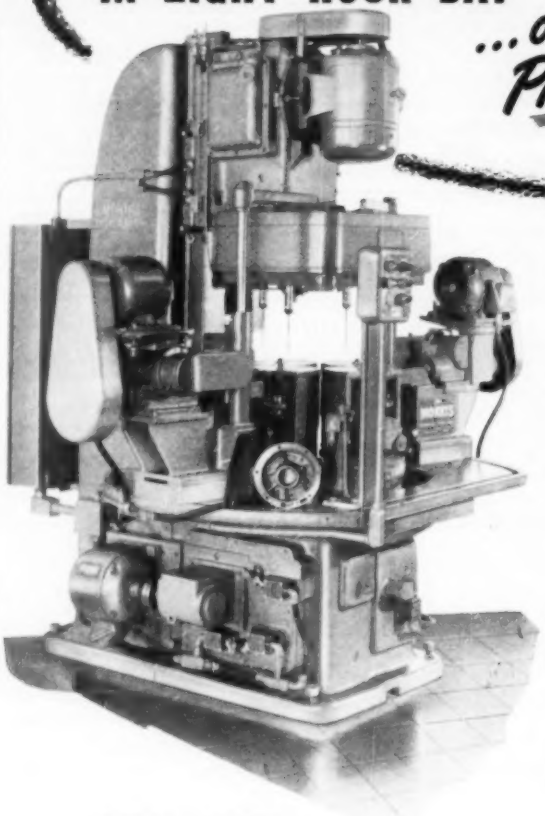
Nov. 1949—235
Oct. 1949—275
Nov. 1948—342

Data: National Electric Manufacturers Assn.



Automobile manufacturer speeds production

600 AUTOMATIC TRANSMISSION COLLECTOR RINGS DRILLED AND REAMED IN EIGHT HOUR DAY ...on MORRIS Production Machines



The drilling and reaming of Collector Rings presented a bottle-neck to increased production of automatic transmissions for a prominent automobile manufacturer. Morris engineers were asked to produce a machine which would provide the production required at the desired efficiency.

The solution consisted of the Morris Vertical Four Station Automatic Indexing Machine illustrated. This production machine has a 24 inch table; one 3-spindle hydraulic vertical head and two single spindle rack fed auxiliary side heads with four mounted hand clamp fixtures. Seventy-five Collector rings are drilled and reamed per hour at eighty per cent efficiency.

If your work requires drilling, reaming, tapping or similar operations, on a production basis, Morris Machine Tool Company can design, develop and build a production machine to meet your specific job requirements.

THE MORRIS MACHINE TOOL COMPANY

"A better product at less cost— with MORRIS ENGINEERED PRODUCTION"

Builders of MOR-SPEED Line

933 HARRIET STREET CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Skill At The Top Not Enough

To get lower costs in his British factory, a midwestern manufacturer installed the latest American high-production machines.

But to his surprise, things didn't work out the way he had expected. His production costs stayed up.

Upon inquiry, he discovered what was wrong. His British shop supervisors were relying upon their outmoded British experiences to direct the newly installed methods. They knew next to nothing about mass-production techniques.

He took quick action. He brought two dozen of them to "The States" for a four months' period of indoctrination in U. S. manufacturing processes.

They soon learned how to get high production from high-production machines. It consisted of much more than merely pushing magic buttons.

Those supervisors are now back in Britain and operations over there are clicking for the first time. The American who shepherded them during their U. S. visit is with them for a time to see that they apply correctly their American lesson.

This story confirms the fact that efficient output is not solely a matter of having the most modern, cost-cutting machines. That is only a part of it. Another part is to train men on the supervisory level in the rudiments and the fine points of their jobs.

Skill at the top is not enough. The personnel down the line must possess skill, too. And that skill should consist of something more than native ability. It should include a thorough grounding in techniques used in making a specific product.

This indoctrination cannot be acquired in a few hours. It takes long periods of instruction and plenty of advance preparation by the teachers.

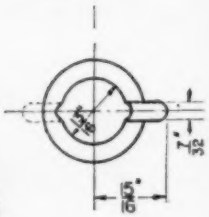
The educational process should never end. The management should meet regularly and continuously with its supervisory group. New techniques, new ideas and new problems are constantly arising and should be dealt with promptly.

More than once, the situation which confronted the midwestern manufacturer in his British factory has developed right here at home, and for the same reason—lack of know-how by shop supervisors.

It can be, and sometimes has been, a costly experience. Proper recognition of the need for training supervisors, followed by appropriate action, will prevent its happening in your shop.

Burnham Finney

IT'S A full-time SHAPER...



PHOTOS—COURTESY THE OHIO KNIFE CO., CINCINNATI, OHIO

PRODUCTION

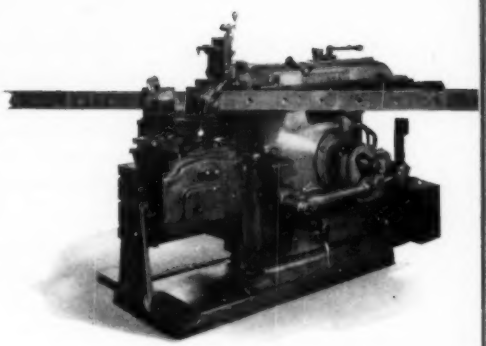
Working two shifts, full time, this Cincinnati Shaper notches fourteen plow-bolt holes in these shear knives every five minutes.

Shapers at The Ohio Knife Company are used strictly as manufacturing tools, for mitering, contour cutting, slotting, corrugating and beveling knife blades.

COSTS

The setups for all these operations are simple, rapid and inexpensive—and a low manufacturing cost results.

Write for Shaper Catalog N-3. It will help you determine the size and type of Cincinnati Shaper you need.



Knives are high carbon, high chrome steel. Cutting tool is high-speed steel. Shaper operates at 119 strokes per minute.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

Wood hands provide a safe, positive method of adjusting pull-out guards, as . . .

WAGNER STOPS PUNCH-PRESS ACCIDENTS

Not a single lost-time accident for two years is the amazing record of Department 26, although 66 presses are operated two and three shifts daily. Here are the simple, effective measures that made it possible

BY EDWARD G. HOLTZMAN, Head of Safety and Medical Departments, WAGNER ELECTRIC CORPORATION

THE employees of Department 26, one of our punch-press departments, worked the entire year of 1948 without a lost time or disabling injury!

This was the first time this had been accomplished in over 40 years. They repeated this record in 1949! How was this done? Were they lucky? Did the law of averages finally give them a break? We think not. We think their record was the result of a combination of hard work, clear thinking, modern engineering methods, and—above all—the development of the right attitude on the part of both employes and management.

Modern power presses are valuable aids to production. They have been responsible for lightening work loads, cutting costs, and raising the standard of living.

But they are the scourge of the safety engineer's existence. Accidents on them usually have a high severity rate. They seem to defy the best efforts to guard the operator from injury.

After a severe punch-press injury, everyone in the department is upset. Before the investigation is completed all concerned are acquainted with the details. In addition to the suffering of the injured man, morale suffers throughout the department and production is affected.

Costs are usually more than for any other type of injury, involving broken dies, spoiled material, doctor's fees, drugs, hospitalization, workmen's compensation, supervisor's time, and finally rehabilitation of the injured employee.

How can injuries from power presses be brought under control? Here is how we did it at Wagner Electric:

Department 26 is a typical punch-press department with 66 presses, including Bliss, Niagara, Henry & Wright, Verson, and Toledo presses. They range from light to heavy duty and perform drawing, blanking, perforating, forming, and subsequent operations. Most operate two shifts a day, and some

of them operate three full shifts.

The majority of these presses are hand fed by premium workers. The presses are guarded with all types of accepted guards. But they were guarded with the same types of guards for several years before 1948, the first no-disabling-injury year!

The change began early in January, 1948, when Steve Lackman, the divisional superintendent of the punch-press departments, came to my office. The conversation went something like this: "I'm again coming to you and Brown [G. W. Brown, industrial relations director] for help. You've done a lot to reduce accidents in my division, but what else can we do? I've raised so much cain with my foremen that they bow their heads when I look at them. That didn't seem to help. I've guarded every press you fellows suggested. We've tried to impress the foremen with the hazards involved, but it doesn't seem to sink in. Why only last month one of the setup men adjusted a punch-press pullout device too long and when the operator started to feed his machine he had the ends of his fingers smashed off! I can't watch these guys every minute; we've got to get out production."

"Steve," I told him, "we've been studying your problem and we've got to start at the source."

"What do you mean by that?"

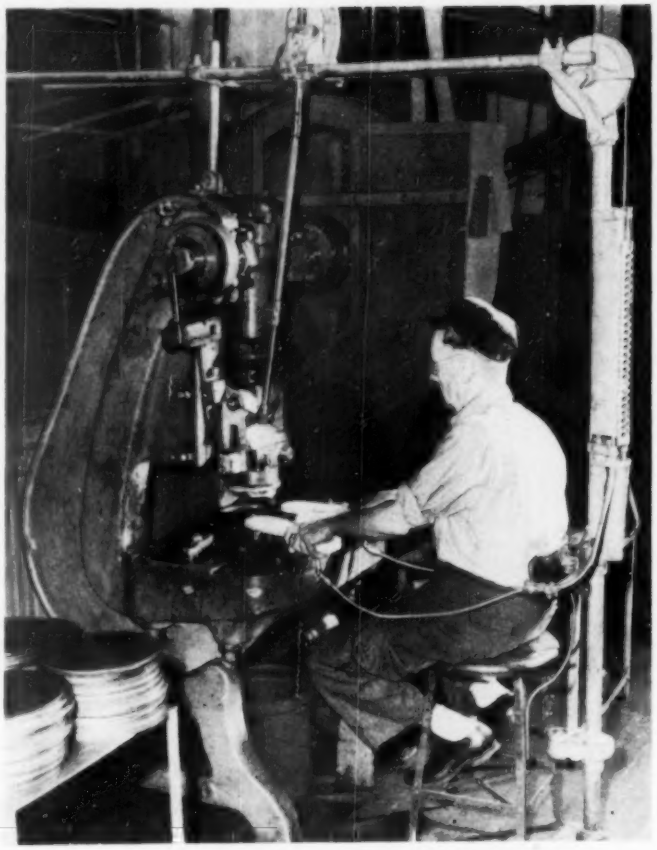
"Isn't it true that every punch-press injury involved a man?"

"Any fool can figure that out, Ed."

"Well, if we agree on that, it would seem that we should start with the operator and concentrate on him."

When I had outlined the plan of attack to him, Steve called a meeting of all the foremen and setup men for the following morning.

"Fellows," he began, "I've called this meeting today to discuss how we can reduce these punch-press injuries in Department 26. I don't have to tell you what these accidents mean—we've been over that. You know every press in the division has some sort of guard on it, but we're still having injuries. Ed has a plan for getting at them."



Guard adjustment is tested by setup man using wooden hands before releasing press to operator

The first step in the plan was to send every punch-press operator to school. The instruction was to be with a series of 2x3 ft pictures of punch-press hazards.* We went through this at the meeting that morning to get the reaction of the foremen and setup men and to enlist their co-operation. They were all enthusiastic.

One man liked the illustrations and the simple explanations of the correct method of operating, another liked the humor, another the way the speaker's remarks are provided on the back of each picture so they can be used without the audience being aware of notes, and another the quiz included to test the effectiveness of the presentation.

As a result, the Safetygraph was presented to all the operators in the department in groups of not more than 14 at one time. At each session, there was free discussion and questions. Some operators stated that they remembered now having been told much of this by their foremen or setup men but that it hadn't sunk in.

This training developed a new safety consciousness in the men. It was observed that operators would point out unsafe practices to each other.

Spotlight on Danger

The next step in the plan was the three-dimensional painting of all presses in the department.

* Operating a Power Press, Safetygraph No. 3, National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

Presses were previously painted a uniform, dull gray. Instead of bringing out the danger spots, the effect was to merge danger zones with safe zones until they were indistinguishable.

In repainting, the body of each press was painted a light green with danger areas painted in orange. Walls and ceilings were repainted at the same time to improve seeing conditions and increase efficiency of existing lighting equipment.

The older "camouflage" method of painting could be likened to a piano with keys of mahogany or walnut, the same shade as the case. Even the most brilliant pianist would have trouble playing such a piano.

Some of the foremen objected at first to what they considered a "sissy" theory. We can't find one today who continues to scoff at the green and orange painting.

Guard Adjustment

Third step was to improve the method of checking guards. All guards are subject to failure as long as the human element has any factor in placing, adjusting, or removing them. Many different operations are required of the same punch press and consequently much re-adjustment of guards must take place.

Unattached pull-out cord is pointed out to operator by safety committeeman

Many safety experts are convinced that all guards should be made an integral part of the die. We believe in this theory 100%. Where the difficulty arises is when a part must be fabricated that will not permit an integral guard. We use pull-out guards for these jobs and find that they can be operated with *positive* safety to the operator.

The pull-out guard operates with

Safetygraph on operating a power press is previewed for foremen by Steve Lackman, division superintendent, before showing to operators in Department 26

a device attached to the ram of a press and cords strapped to the operator's wrists. When the ram descends the operator's hands are pulled away from the point of operation.

However, it was mentioned earlier that an operator had his fingers amputated because the stroke of the guard had been improperly adjusted. To prevent this type of accident we made wooden hands to serve as a guide in setting up.

First the wood hands are checked for size with the hands of the man who will operate the press to make sure that his hands are not larger. The setup man must then operate at least 10 pieces with the wood hands attached to the pull-outs before the machine is released to the operator. In addition, a machine repairman is specifically assigned on each shift to check each device before the oncoming shift takes over the presses.

Since this system was established there have been no injuries on presses guarded with the pull-out device.

Safety Recommendations

The fourth step in the program involved a follow-up to maintain the safety consciousness that had been established. Foremen regularly were called into safety meetings for discussion of the safety campaign. Foremen closely watched all safety guards and press maintenance.

"Howard . . . will you tell those women that you're not wearing handcuffs — and not chained to that press!"

The hourly rated employee selected as safety committeeman in each department was a valuable aid. A safety check list report to the foreman was designed by the safety department. The safety committeeman took one hour each week to investigate hazards in the department.

A copy of this report was sent to the safety department, which followed up each recommendation. During the first year there were approximately 200 recommendations and every one of them was adopted.

The campaign paid off when Department 26 won its first award for completing a year without a disabling injury. This award, a Sheaffer Fine-Line fountain pen for each employee, was well received and gave us a good start in 1949.

Our company also placed first in the Heavy Machinery Division of the Metal Section Contest sponsored by the National Safety Council. The remarkable record of Department 26 was an important factor in this plant record.

Department 26 has, in 1949, just completed its second straight year without a lost time or disabling injury! Our experience has shown that even a punch-press department can achieve a good safety record if it will work for it. The results are well worth the effort.

RADIOACTIVE PISTON PLATING SHOWS FRICTION EFFECT

SLIDING FRICTION is caused by, among other effects, the instant making and breaking of tiny adhesions, or welds, between the contacting surfaces as they slide together. To determine just how much of normal friction is caused by this welding, studies are being conducted at Massachusetts Institute of Technology by John T. Burwell and S. F. Murray.

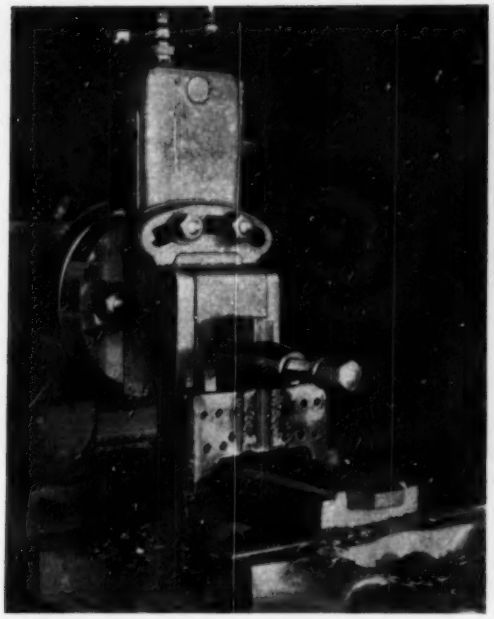
The research technique is to plate one surface—the OD of a piston ring — with a radioactive isotope and to examine the other surface—the piston cylinder—after they have run together for traces of radioactive material.

Piston rings for the single-cylinder engine used in the test were chromium plated by the manufacturer, and were cleaned and rinsed before radiochromium was plated over the original chromium in an electrolytic plating bath. Thickness of the active plate was estimated to be about 0.0014 in.

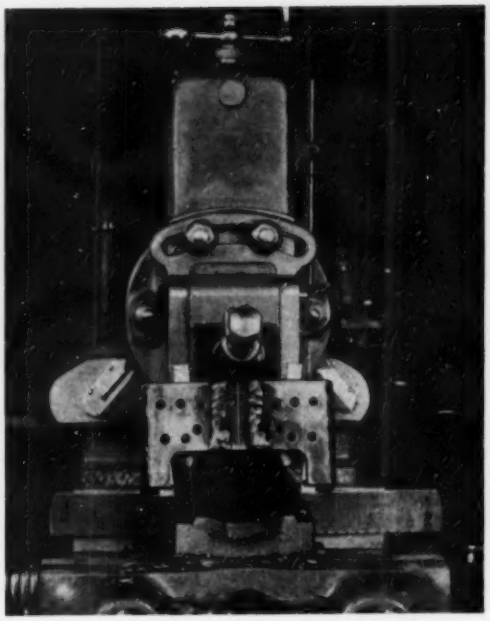
A run under normal operating conditions was made with three specially plated rings in place. After this, the cylinder was removed from the engine, cleaned and degreased, and a photographic plate was inserted in the barrel for 48 hours.

Activity of the radioactive material formed a pattern on the plate which indicated a number of actions in the cylinder. A single vertical line on the plate showed where the ends of one ring scratched the cylinder wall and deposited radioactive material. A few white specks on the plate here and there showed that some chromium was transferred by sliding friction to the cylinder—this was not removed with normal cleaning methods. Exposed areas near the top of the cylinder showed where chromium was transferred—presumably because there was little oil at the top of the cylinder and because chromium remained there despite the heat and oxidation in the firing chamber.

This technique — using radioactive materials in the frictional transfer of metal, and photographic identification of results—may have possibilities in many mechanical fields. Bearings, gears, belts, and many other mechanical power-transferring mediums can conceivably be investigated much farther than was formerly possible because even a minute amount of radioactive material can be instantly detected and located.

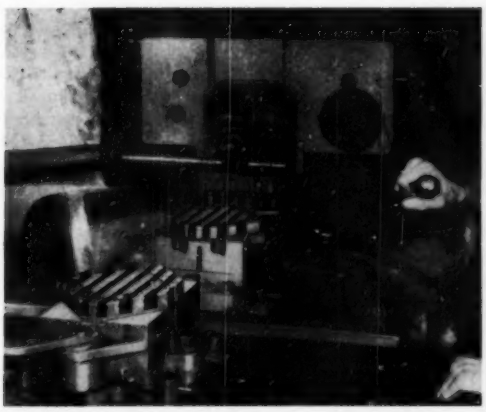


Glass molds are shaped on four different surfaces with the same tool setup to allow complete mold interchangeability. Gage plate flush against rear of workpiece serves for setting toolbits in place before being clamped by setscrews through steel-plate toolholder

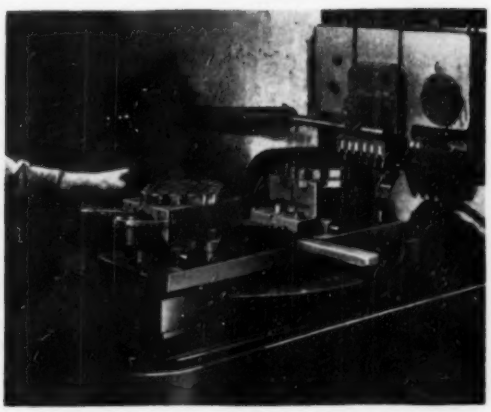


Four cutting tools (½ in. square) work to 0.0005-in. tolerance and machine at 70 fpm on 18-in. stroke and 0.010-in. feed per stroke. Production cost lower than milling is provided by cheap tools, quick sharpening, and longer time between sharpenings

Shaping Multiplies Its Cutting Edges



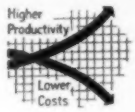
Warnock diagonal blocks for printing presses are formgroved on a Cincinnati shaper equipped with an indexing fixture. Block with squared slots is clamped in one fixture while toolblock cuts six slots in other block. Tools are edged on both sides and bottoms



Ganged toolbits in toolblock are cooled by oil from drilled pipe over clapper box. Tools cut one side of slots for nine strokes, then shift to cut other sides for nine more strokes. . . . . turning out 90 pieces per hour. Work is clamped by split holders, cam operated

Key men in any cost-reduction program, foremen are familiar with production problems; know where bottlenecks exist. These men have proven that to B. & S. Is the background and experience of your foremen being utilized to maximum advantage?

FOREMEN CAN HELP CUT COSTS



Management across the Nation is ever more aware of the importance of active foreman participation in cost-reduction programs . . . Here is how Brown & Sharpe got the ball rolling

BY WM. M. STOCKER JR.
Assistant Editor

Higher production at lower cost can be achieved. Basic experience is the most versatile cost-cutting tool available — and many shops carry a large, but often unexplored, inventory of just such know-how. Too often, cost-reduction ideas are expected from the people at the top only—with little thought given to those people involved with actual production problems. Top management should plan, initiate, and oversee the entire program; production and engineering specialists can develop flow-charts and scientific methods; but **for basic cost-cutting ideas, ask the people on the fighting line.**

Recently, AMERICAN MACHINIST published a 24-page "Cost Cutting Clinic." Born of the contention that cost "chipping" at the individual details is as vital to saving as complex planning, it has a twofold purpose: (1) to provide a simple check-list of the functions and operations normal to most manufacturing—which would serve as a guide to planning, (2) as a comprehensive compilation of sound cost-saving ideas.

In collecting material for the "Clinic," we wrote to 600 metal-working manufacturers, selected at random from many sources. Each request included a list of specific operations, and the manufacturer was asked to tell us his ideas about each. Among the many returns was one from the Brown & Sharpe Mfg. Co. which had special significance.

B. & S. used our request to round out its own cost-reduction program. Realizing the importance of getting foremen into a plan of this type, executives had been searching for a means of stimulating interest. Here was the answer! Forms were prepared and sent to foremen whose departments were concerned in the survey. Each was requested to write in any ideas or short cuts that could result in operational saving. Returns were collected and collated by the company, then the forms were forwarded to us.

Here are some of the suggestions:
Milling—Try:

Swivel fixtures for work with finished surfaces on two or more sides.

Screw arbor cutting in place of end mills for keyways. Quite often keyway design can be changed to permit this type milling.

Milling fixtures that include cutter setting blocks.

Preliminary sawing before milling single-piece jobs without fixtures.

Avoid:

Use of index head when use of vise will permit using higher feeds.

Boring—Try:

Air gages to eliminate out-of-round and taper holes.

Pin cutters instead of reamers and blade tools for round holes.

Avoid:

Figures and drawings which give only center distances. Square dimensioning to a base line is easier for operator.

Sawing—Try:

Resharpening power hacksaw blades.

Check:

Layout, for supplying material to cut-off machines for efficient planning.

Assembly—Try:

Eliminating deferred operations on the erecting floor by making parts interchangeable.

Degreasing parts before assembly.

Master plugs and shafts for maintaining concentricity during assembly.

Storing parts and tools adjacent to the point of operation, to minimize handling.

Grinding a 12-in. long bar to a taper of 0.0001 in. to facilitate selection of proper size bearing hole for assembly to measured ball or roller bearing diameter.

Brazing—Try:

Induction heating for brazing carbide tips to cutters and tools.

Polishing—Try:

Holding a magnetic chuck in a bench vise to use it as a fixture for polishing small parts.

Welding—Try:

Spotwelding aluminum sheet on equipment of limited capacity by placing a thin piece of sheet steel between the welding electrodes and the aluminum.

Avoid:

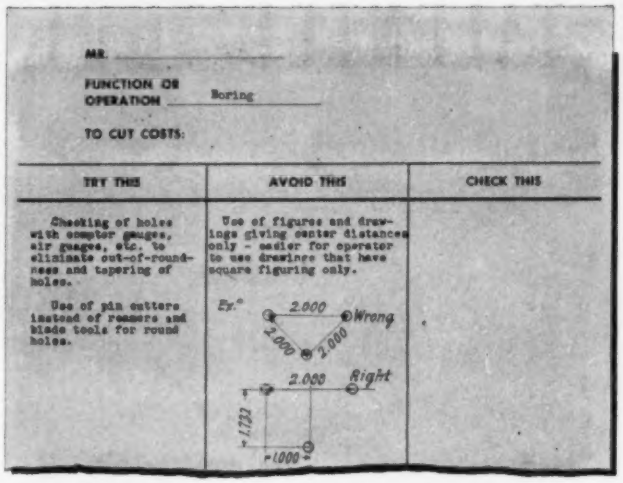
Forcing, by increasing current or duration of weld time.

Check:

That finish side faces upper electrode.

Packing—Try:

Standard measuring sticks with depressed marks for lengths of lumber to be cut. Also plywood templets for marking-out oddly shaped blocks.


MR. _____

FUNCTION OR OPERATION Boring

TO CUT COSTS:

TRY THIS	AVOID THIS	CHECK THIS
Checking of holes with comptor gauges, air gauges, etc. to eliminate out-of-roundness and tapering of holes. Use of pin cutters instead of reamers and blade tools for round holes.	Use of figures and drawings giving center distances only - easier for operator to use drawings that have square figuring only. Ex.° 2.000 Wrong 2.000 2.000 2.000 Right 1.732 1.000	

Cost-cutting questionnaires were sent to foremen supervising operations included in the survey. Purpose was to draw ideas that would save in day-to-day operations. Foremen have specific know-how that can pay long-range savings

Maintenance—Try:

Sectional lamp-changer poles and rigid-conduit suspension lighting to minimize ladder toting.

Dry scrubbing machine to keep main shop aisles clean.

Portable pump on truck to remove oil or emulsion from tanks and machine bases.

A pipe line from each floor to the storage tank will cut the cost of handling old oil. A similar line would speed the carrying of reclaimed oil to machines.

Only a few of the many suggestions, these are not awe-inspiring but they are important. Each one represents a small saving which, repeated daily and combined with thousands of other small savings, can produce a staggering total. B. & S. know this; they also know that although foremen are hired for their ability to handle men and machines, you cannot always say to them, "Tell us how you can save $1000 in your department this year!" It doesn't work; the man immediately thinks in dollars instead of in operations.

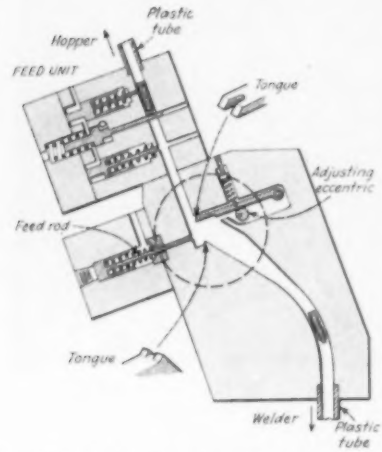
Instead they say: "We need your help. What operations can be improved or eliminated to increase production and lower cost?" To each foreman this is a challenge, an invitation to take part in management. His advice is needed! Response is usually generous, and the attitude catching. Everyone becomes cost-conscious, each contributing his ideas and meanwhile trying to do his immediate job a little more efficiently. The combined effects of this attitude are a considerable saving. Valuable ideas are no longer buried in a single department, but pooled for use wherever they will fit.

Today's economy makes the need for cost-reduction programs mandatory. Those among management who are responsible for the effectiveness of such plans will do well to enlist the valuable aid of their foremen.

Fast Heat Treat

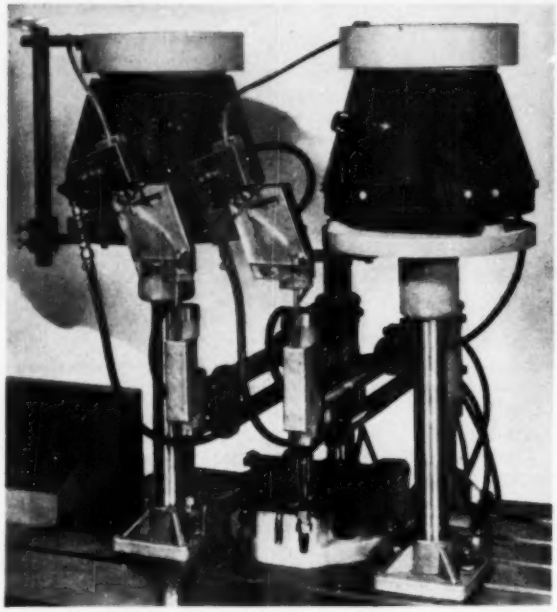
GE HAS DEVELOPED a high-speed process for tempering small metal parts. Pieces are mounted on electromagnets which hold them in an induction-heating field. When the piece is heated to 1600 F, an automatic timing switch cuts off power from induction coil and magnet, so the piece drops into a quenching-oil bath. Total time is under 5 sec.

☆ TALENTED TOOLING

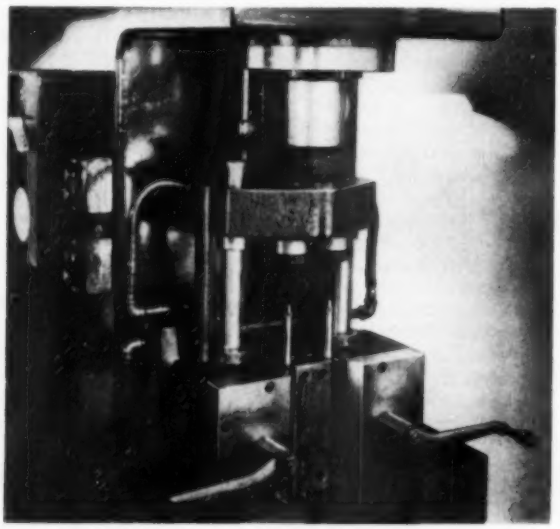


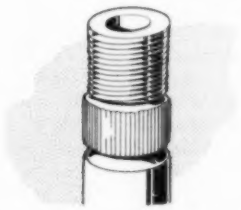
Stud with tip down is passed by lower tongue and held by upper tongued stop bar as feed rod throws it onto tube. Stud with tip up is held at lower tongue, passed by upper stop bar as feed rod makes it turn over. *Graham Mfg.*

LUCITE-COVERED MECHANISM TURNS AND FEEDS STUDS



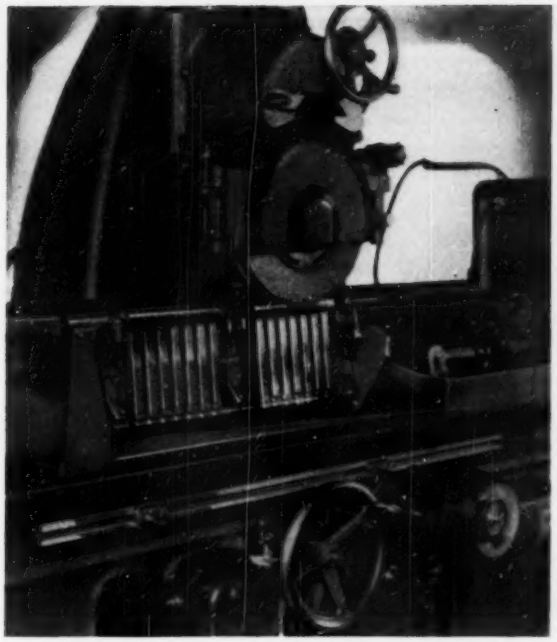
Hopper feeds to stud-welding machines would not insure stud tips were down until a sorting device was added to the gravity feeder. Transparent plastic plates and tubes in feed now allow operator to see action



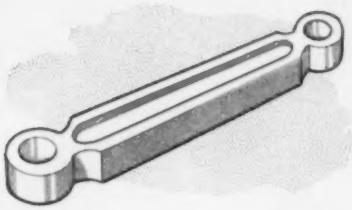


Serrations next to threaded ends on steering-column shafts are cut into a relief groove in a double setup on a 12-in.-stroke machine. Dies are solid; are sharpened at one setting where the wheel is angled slightly and the dies are turned during the operation to produce the required hook on cutting edges. *Colonial Broach*

SINGLE-PIECE DIES BROACH SHAFT ENDS

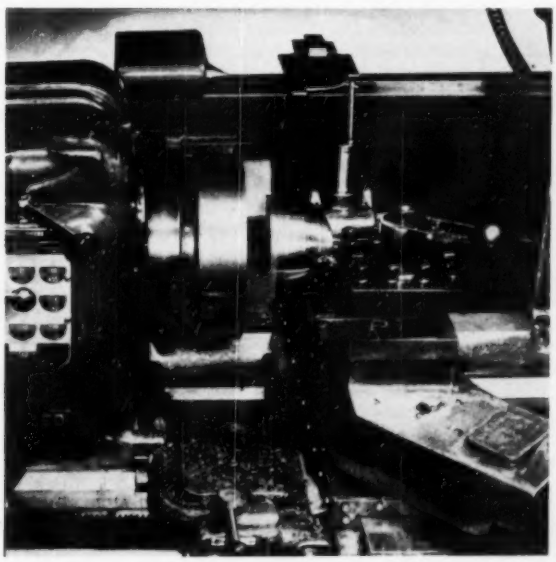


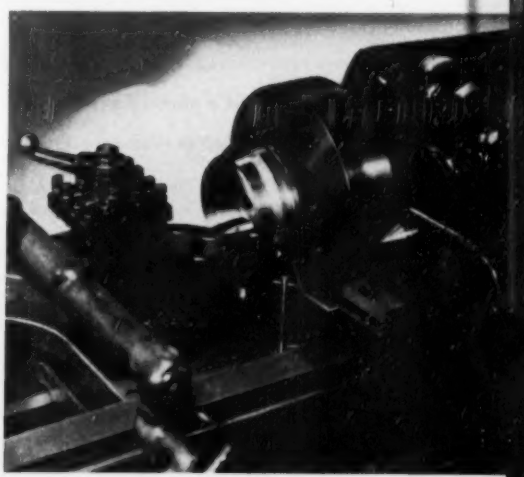
OSCILLATING FIXTURE TWISTS RODS FOR RADIUS GRIND



Wheel dresser forms partial radius in grinding wheel, but nearly full circle on articulated connecting rods is ground as fixture turns 14 rods at a time under the form while the table reciprocates. *Mattison Machine*

HYDRAULIC TEMPLET FOLLOWER BOOSTS LATHE OUTPUT

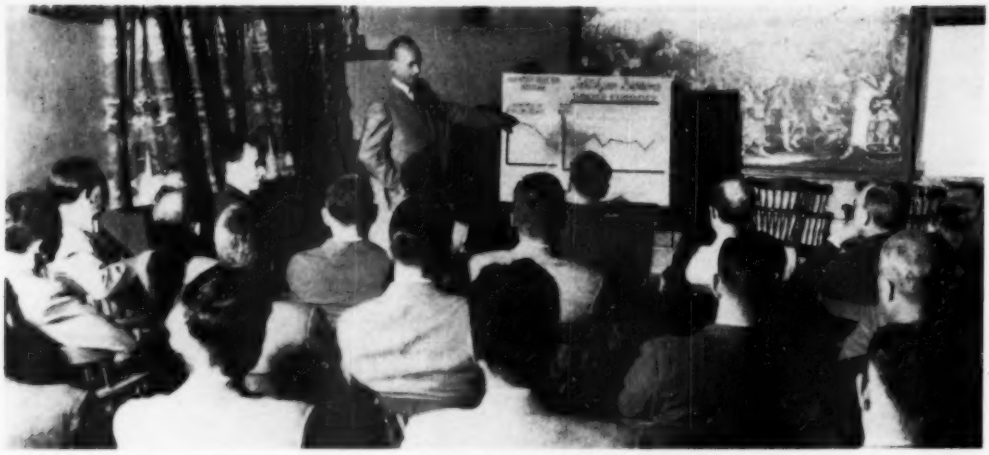




Duplicating lathe with hydraulic toolslide control follows simple plate templet on back way to form the radiused end of a piercer point in 20% of the time formerly required

Half the time regularly required is enough for the hydraulic duplicating lathe to turn out 3¼-in. dies. Permanent center on back way allows roll following. *American Tool Works*

MEETINGS *explain the inventory problem and get the program rolling*



Initial step in selling inventory control is to demonstrate the importance of keeping inventories in balance with changing business levels and to convince the organization that inventory control is everybody's job. Specific objectives then are stated and plans for attaining them are outlined. Presentations are planned to hold interest

IT PAYS TO SELL INVENTORY CONTROL

Immediate reductions in inventory and higher inventory turnover are the dividends of a planned program that is turning up big dollar savings by stimulating interest in inventory at all levels of the organization

BY D. S. LISBERGER
SUPERVISOR OF INVENTORY CONTROL
APPARATUS DEPARTMENT
GENERAL ELECTRIC CO., SCHENECTADY

MAKING everybody conscious of his part in inventory control is the objective of an all-out "selling" program by General Electric's Apparatus Department. Everyone, from engineer to foreman, is being reached to emphasize the importance of the part he plays in maintaining efficient inventory levels. As a result, inventory reductions have been made in record time and the Department actually has increased its turnover in the face of a fluctuating output.

When the program originally got under way, the inventory situation throughout the industry threatened to become acute. Commodity prices had already started to decline; zinc, lead, and steel scrap were down; a fall in copper prices was imminent. Incoming orders were beginning to drop noticeably and backlogs were shrinking. The squeeze was on and the inventory had to be given close attention.

Although inventory control was not a new subject and there had been many inventory drives in the Apparatus Department, the urgent conditions required a new approach. The problem was to capture the interest and support of everyone in the organization who could help, either directly or indirectly. If this could be done, a successful result was inevitable.

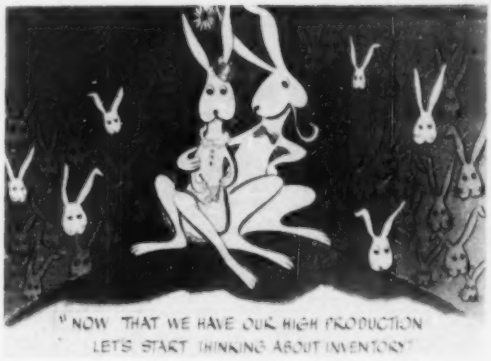
You Have Two Things to Sell

Actually the problem was analogous to that of planning a sales program. There were two products for sale: the first was an inventory reduction starting immediately; the second was the long range problem of permanent and continuing improvement in inventory performance. The market was the thousands of people who, through their efforts could speedily reduce the inventory.

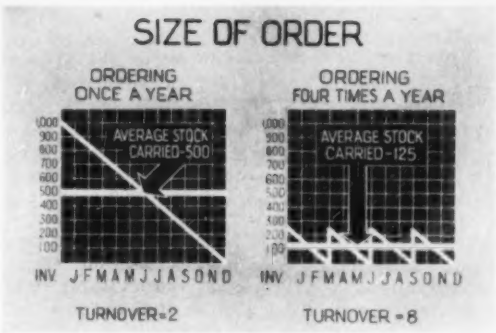
The first step was to establish clear-cut objectives against which progress could be measured. As the urgent problem was to maintain a proper relation between inventory and output, an inventory-reduction program expressed in dollars was quickly set up to cover the next six months. This objective was then broken down into divisional and subdivisional levels.

While the six-month reduction program was the immediate criti-

SLIDES ***help to put across the inventory message***



Inventory problems are pointed up by slides shown during initial meeting. Analogies and cartoons enliven subject, yet make the problem clear and emphasize importance of the inventory responsibility of each individual in the group


SIZE OF ORDER
ORDERING ONCE A YEAR
AVERAGE STOCK CARRIED-500
INV J F M A M J J A S O N D
TURNOVER=2
ORDERING FOUR TIMES A YEAR
AVERAGE STOCK CARRIED-125
INV J F M A M J J A S O N D
TURNOVER=8

cal objective, achieving better inventory performance in the future was a second major objective. Millions of dollars had been spent on product development and facilities in recent years. Many of the improvements contributed directly to inventory performance, and it was generally agreed that there were opportunities for increasing inventory turnovers well above the levels which were considered acceptable in the past.

Appraise Your Market

Several considerations were important in this inventory selling program. First, the Apparatus Department is a very large "company" in itself, with millions of dollars of sales annually, and highly diversified products. They range from small electrical devices to the world's largest turbines and motor generators. Consequently, a great many people are in a position to exert influence on the inventory.

For example, a routing clerk, in a sincere attempt to reduce direct machine costs, may route a part through eight or ten factory areas —when he could, with a slight increase in direct machine costs, reduce the routing areas to only two and save in inventory costs far more than the extra machine cost. A dispatcher or foreman may group orders to reduce setup costs, but by so doing, add pieces to the inventory long before they are needed.

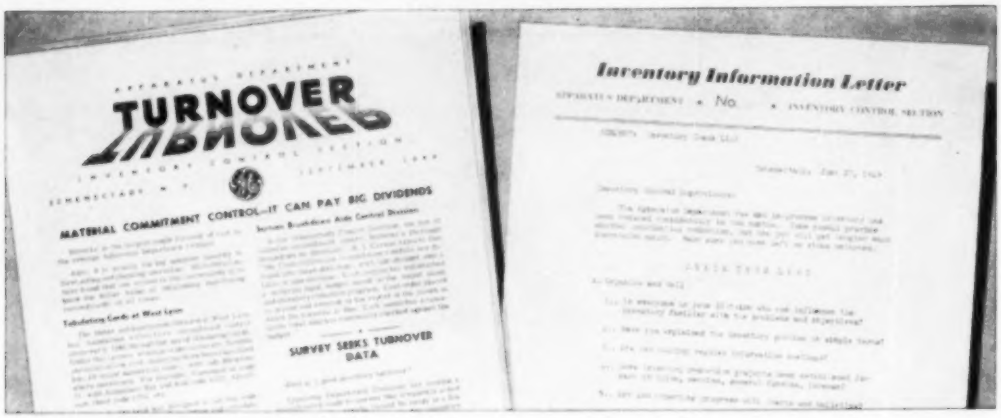
The second major consideration was the nature of the inventory itself. In the Apparatus Department, the largest segment of inventory is work in process—materials and labor in the factories under the the control of a vast manufacturing organization. Therefore, active participation by the line manufacturing men was essential to success. Furthermore, with in-process inventories being such a substantial portion of the total, the hoped-for long-range improvement in turnover depended on the contributions of the large supervisory organization whose ideas and experience could serve to increase the tempo of inventory flow.

A third factor was the general attitude of many manufacturing people in industry toward inventory. The war and postwar emphasis on "production, no matter what" had produced an inventory philosophy throughout the organization which would not be easy to change. The program would have to be new, lively, and interesting. It had to appeal to as many emotions as possible such as humor, curiosity, shock, security, and pride.

Put Your Story Over

Meetings—The first task in putting the program into effect was to get the story across to as many people as possible, and do it fast. This was accomplished by a series of meetings within each operating division. In one division, for example, an inventory plan was established with the theme "Get Everybody Into the Act." The plan included the specific inventory reduction ob-

NEWSLETTERS *keep enthusiasm high and offer valuable suggestions*



Magazine *Turnover* is devoted entirely to inventory control and is issued monthly to more than 600 readers who can affect inventory. Progress and accomplishments are reported, and competition stimulated. Inventory Letter carries spot bulletins, progress reports, and suggested action for those working directly on inventory

INVENTORY CONTROL
continued

jectives for the drive and a step-by-step program of what would be done and who would be responsible for getting it done.

The plan was first presented at a formal meeting to management representatives of the division. The inventory story was clearly pictured with graphs and illustrated charts. Next, the plan was presented to the operating personnel in each section, with special emphasis on the sections' individual programs. The series of presentations made certain everyone was familiar with the objectives and the plans to achieve them.

In another division, the program was launched with a dinner meeting for all division foremen. The program was carefully outlined in terms which could be easily understood. If a division desired assistance from the headquarters staff, a representative was available to lead the meeting.

In every case the story was told with interest and color. Charts or slides were used to illustrate each point. Cartoons and simple analogies were used liberally. Turnover was explained in terms of a newsboy's business or a popcorn stand. Obsolescence became an easily understood problem when pictured as an old-maid daughter or troublesome mother-in-law.

The story of business bankruptcies because of failure to control inventories, taken direct from the files of Credit and Collection Office, made the problem very real.

The importance of an individual's inventory responsibility was put across emphatically, but humorously, with cartoons, posters, and publications. A typical photo-cartoon pictures a foreman atop a bag of money representing the inventory dollars under his control.

Shortly after the division meetings opened the reduction drive, top-management support provided the first follow-up. A series of luncheon meetings were arranged to cover each principal factory, and the Department Vice President personally described the serious situation to key supervision.

Get Widespread Action

The initial meetings were aimed at telling the story and reversing the inventory trend in a hurry. It was recognized, however, that a reduction of the magnitude which was planned and a continuing improvement in turnover would require participation by a large part of the organization.

Inventory Committees — One approach toward this end was to set up a series of inventory committees in each section. A committee, consisting of individuals from manufacturing, engineering, production, and cost functions, formulated a plan of attack for its particular section. Then separate groups were assigned specific problems. One would concentrate on reducing manufacturing cycles, another on a detail review of the selected "high-value" parts in the product; another on standardization.

Goals—Excellent results were obtained by having the foreman, along with the planning and production organization, establish goals in terms of number of pieces which were to be met by a certain date. The pieces were then converted to dollars to measure the individual sections' contribution to the reduction program.

Once the enthusiasm of the general foremen and foremen was aroused, the results were dramatic. In one plant, for example, a group figured out a way to rearrange an assembly procedure for a large product and reduced the inventory by a quarter of a million dollars, with the addition of only one inexpensive fixture.

CARTOONS *dramatize the inventory battle*

Cartoon figures appear regularly in each issue of *Turnover*. Lord of the underworld is symbol for old-fashioned operations; haloed chap typifies modern methods

Reports — Divisions devised numerous ways to stimulate interest. One plant distributed special forms for stockroom employees to report questionable stocks for review. Prompt action on every report kept stock handler alert and quick to notice slow-moving items.

Keep Their Interest Up

Newsletter—Publicity being a key part of a good sales program, a monthly newsletter was introduced in March. It is called *Turnover* and is entirely devoted to inventory. Its purpose is to provide a media for the exchange of ideas and to stimulate interest. It is distributed to over six hundred people in all phases of manufacturing and production and provides an excellent means of reporting progress, stimulating competition, and giving recognition to divisions and individuals who contribute to the success of the program.

The September issue is typical of the subjects covered in *Turnover*: (1) a story telling how one division eliminated 80% of the expense of countng its physical inventory by precounting stock items during the vacation shutdown; (2) a short story written in dialogue putting across the importance of selecting correct order quantities; (3) two examples of manufacturing cycle reduction; (4) a biography and photograph of a division Inventory Control Supervisor; (5) a picture story telling how one division increased the turnover of lumber from 6 to 27; (6) reports of the progress being made in the reduction program.

The publication is carefully edited, is attractively illustrated and printed, and stories are kept brief and to the point.

Information Letter—In addition to *Turnover*, an Inventory Information Letter was introduced for distributing up-to-the-minute information to personnel working directly on inventory. Significant developments, instructions, and suggestions can be rapidly transmitted to operating personnel. Test checks indicate that an attractive green letterhead improved the reader's acceptance of this type of information considerably.

Control Manual—Another valuable tool is an Inventory Control Manual issued in 1949 which contains much valuable information on inventory procedures. It has proved to be of considerable help, particularly to individuals who have been assigned to inventory work for the first time.

The over-all results of the "selling" program have been excellent. Not only did the Department exceed its inventory reduction program by a comfortable margin, but the intensive effort by a large group of people has assured higher inventory turnovers in the future.

Supervisors who previously believed inventory was "somebody else's worry" have discovered how important it is, and how much influence they can exert on it. Perhaps not typical, but indicative of the interest in decreasing inventory that has resulted from the drive, and of the support it is getting, was the fork-truck driver who stormed up to a production manager. "I just delivered 10 skidloads of castings to the store room," he said, "and production only needs one skid a day. Now how are you going to reduce the inventory with a situation like that?"

Tips FOR TOP SHOP MEN

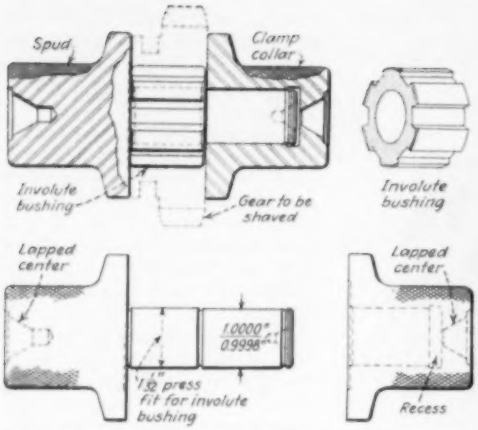
318 You can step up interest in company headaches by skits in which employees do the acting. Shop problems can be dramatized with topics selected by the players. Not only does the message go over better but the actors are happier on their jobs.

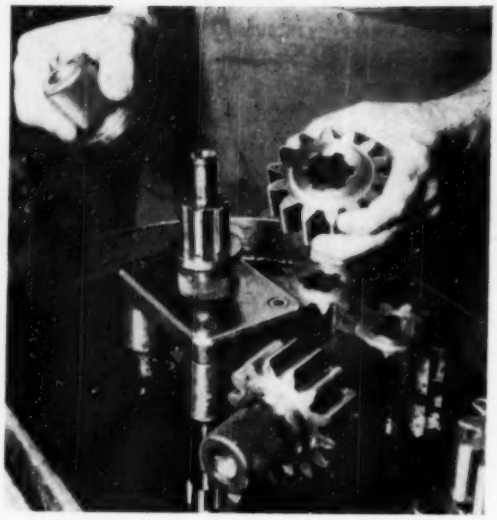
319 Assure your men that no layoffs will result from job improvements. Fear and insecurity are your greatest obstacles to employee cooperation on labor-saving devices.

320 Prepare the way for changes you contemplate. Show your men the benefits of the move. Keeping it under cover and springing it suddenly only arouse suspicion as to your motives.

321 If your plant is still departmentalized, study the advantages of straight-line rearrangement. Handling is usually too expensive nowadays to justify the luxury of having each type of machine tool segregated. The same goes for heat treating, cleaning and assembly.

322 Be sure you are modernizing a *job*, not just a machine. A new piece of equipment never gets a fair chance if units ahead and after it are still ancient klonkers and if feeding and workhandling devices are inadequate.





Spud is located in support on assembly table, and gear and clamping collar are added while shaving machine works on another assembly. Arbor parts are all tool steel hardened to 60-62 Rockwell C and ground and lapped. Gears without splines are handled by other arbors

SHAVING ARBOR AND DEBURRING METHODS

Tractor gears are finished at John Deere's Dubuque Works by operations that both speed performance and make them more uniform. Shaving-machine table centers exert holding pressure, and two deburring techniques—an abrasive belt and a brush-equipped polishing lathe—clean gear-tooth edges

BY BEN C. BROSHEER
Associate Editor

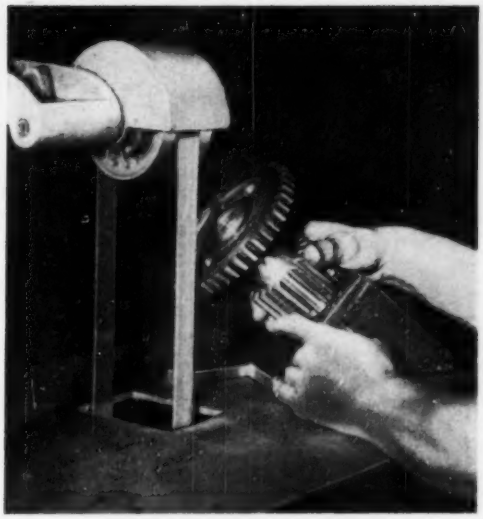
1 Threaded arbors and collars that clamp gears between centers on shaving machines waste assembly and dismantling time, and they also permit the gears to be clamped in a cocked position if the threads become worn. To get around this situation, John Deere transmission gears are assembled on spud arbors and clamping collars that clamp the gears with pressure from the centers on the shaving machine. Arbors and collars are lapped to a close sliding fit, and their center-holes are lapped so the clamping surfaces will hold in perfect alignment as they squeeze the gears.

Several arbors are made up for each gear to be shaved so one or more machines can be operated continuously. Involute bushings are made for splined gears, and plain bushings for gears with smooth bores. When gears are small, arbors are machined and lapped to the bore sizes and bushings are not employed.

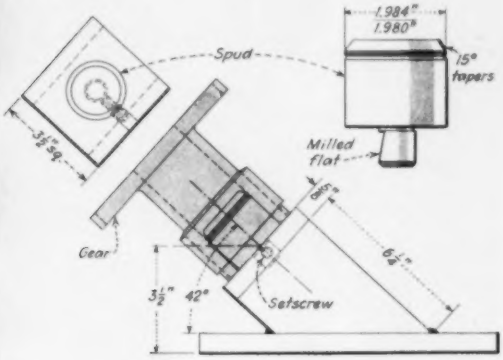
2 Gear-tooth profiles can be hand-filed before the gears are heat-treated and are often finished this way, but more uniform finishing has been accomplished by deburring the gear edges after hardening with an abrasive belt. A Williams belt grinder, provided with hardened-steel guide strips that locate a welded fixture, finishes gears that must have their tooth forms rounded off. Power-shaft cluster gears are held on a 1.980-to 1.984-in. spud at an angle that permits burrs to be removed from both edges of all gear teeth in a reversible setup. The fixture baseplate, spud, and guide bars are cyanide-hardened to cut wear.

In both setups the gear is rotated rapidly by the operator—which is allowed by flexibility in the belt and the angle at which the work is located. This produces a chamfer on all tooth edges that is not perfect, but is more uniform than that normally produced by hand filing.

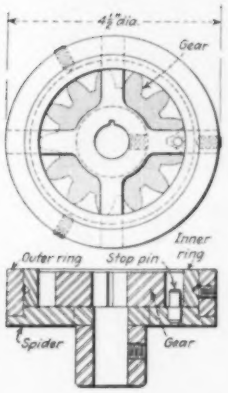
3 Gears for hydraulic lift pumps must be deburred with high accuracy to prevent rounded gear teeth

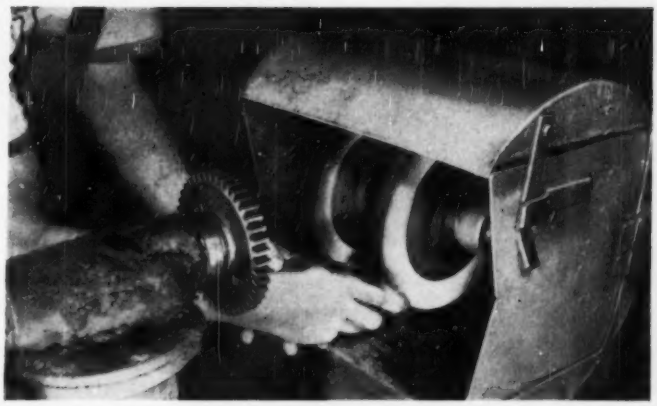


Power gear is held at 42° from horizontal in welded-steel fixture. Hardened guide strips locate fixture on left and right side so all tooth faces can be deburred. Spud nose is grooved to simplify gear mounting which cuts floor-to-floor time loss



FINISH GEARS FASTER

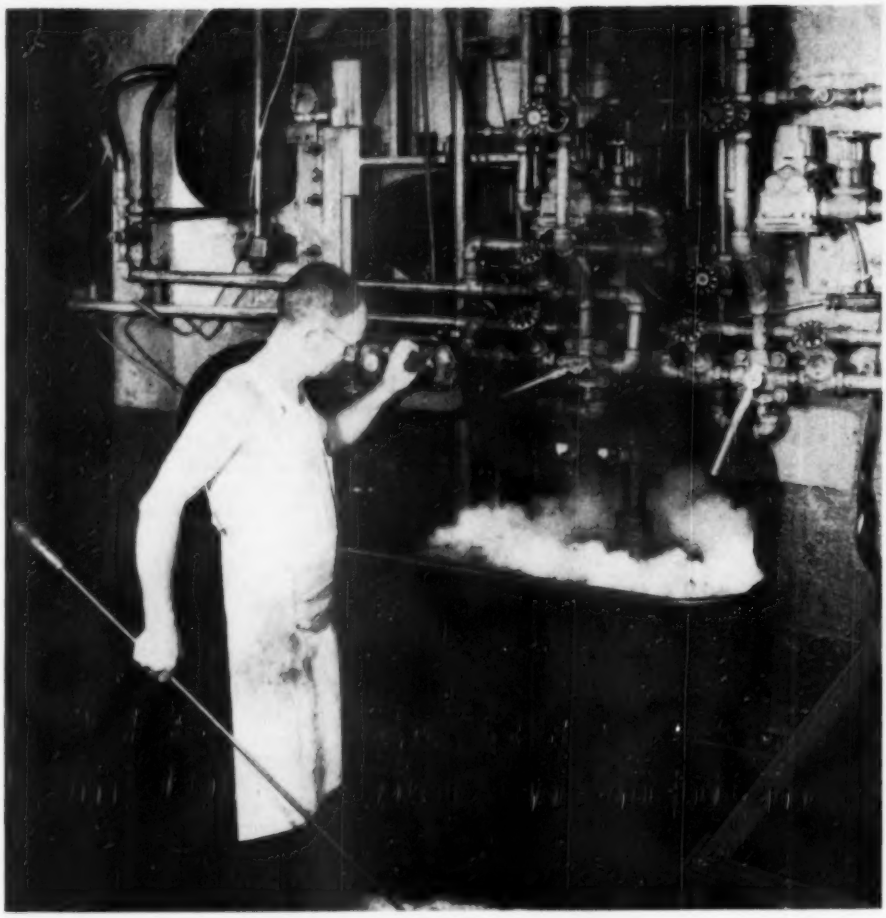




Special unit carries transmission gear in front of polishing lathe equipped with two fiber brushes for deburring. Light application of rouge compound is required after each work cycle. Pin keys hydraulic-pump gear into cup adapter (not shown in photo) and hardened inner ring which protect gear edges yet permit deburring in the same setup

or chamfers that will allow bleeding of the hydraulic pressure. These gears, and final-drive pinions and some transmission gears, are finished on a Hammond polishing lathe fitted with an Osborn power-driven work spindle. Two 12-in. Osborn Tampico brushes are spaced apart by bushings so they contact the opposite edges of the gears, and are driven at 2500 rpm. The work rotates at 15 rpm, and requires only a few revolutions.

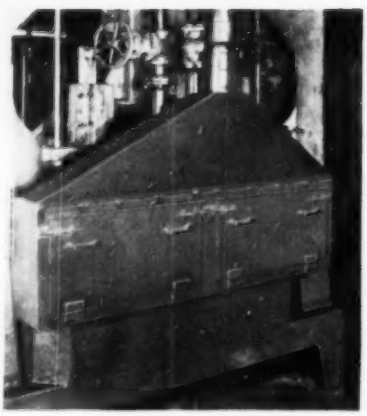
Gears are held in a hardened inner ring inside a cup adapter so the brushes will not round the tooth edges while removing burrs. After one side of each gear has been deburred, the gear is reversed in the cup and the other side is finished. After each deburring cycle some Roberts burring-rouge compound is applied to the brushes.



HOOD EXHAUSTS FOG FROM HARDENING PRESS

Fog removal may be new on aircraft runways, but it is old hat in the race-hardening department at Timken Roller Bearing Company, Canton, Ohio. There batteries of quenching presses are fed from rotary and continuous furnaces with races heated for tempering. Each race fits over a mandrel, is clamped from above to minimize distortion, and quenched in oil. When larger races, in particular, are quenched, the oil boils furiously, releasing mist and smoke which would make working conditions unsuitable, to say the least.

To trap and remove fumes and fog, exhaust hoods have been installed on each press. They draw fumes back and up through fans to oil collectors, then through roof stacks. The picture at top shows a 2-ram press for medium-sized races at the instant of first quench. In the operator's right hand is the hook with which he picks heated races from a rotary furnace at the left of the press and places tempered ones in the tote box at lower right. At right is the exhaust hood on the same machine, showing the doors for access to the press for die changes or servicing.



Bottom of copper-clad pan is ground in 7 sec on a formed contact-wheel grinder equipped with power-fed fixture. One manufacturer uses 12 machines for this operation

Equipment for Abrasive-Belt Grinding

BY RUPERT LE GRAND, Associate Editor

THE STEP from a sheet of "emery cloth" to an abrasive belt remains significant to the metalworking industry. For the abrasive belt is becoming increasingly important as: (1) a metal-cutting tool, and (2) a means for reducing and often eliminating conventional or set-up wheel polishing.

To use the abrasive belt effectively in two distinct fields of application, considerable machine development has taken place since introduction of the backstand polishing unit. For "dimensional" work, grinders are now available to grind surfaces to close relationship and size. Here, the cool cutting qualities of the abrasive belt are major factors in avoiding distortion. For "non-dimensional work", flat surfaces are produced, contours are ground, flash and scale are removed, surface finish is improved to minimize or avoid polishing.

And with introduction of several types of machines for these purposes, parallel developments have been made in fixtures, accessories and types of belts for a wide variety of production needs. This Special Report classifies available equipment and makes suggestions regarding abrasive-belt grinding practice, according to recommendations from a number of sources.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

Copyright 1950 by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

Economies of Abrasive-Belt Grinding

Within a comparatively few years, abrasive-belt grinding and polishing (the latter to a 3 micro-inch finish) often called "sanding," have been developed for two purposes:

1. Finish machining of castings, diecastings, forgings, weldments and plastics.

2. The production on metal articles of a finish that is satisfactory as it stands or reduces the extent of polishing required. Considerable economies in polishing often result from prior application of the faster-cutting abrasive belt.

In machining applications, dimensional control is readily obtained for flatness, thickness, parallelism, taper and contour. Since the setup time is small, and fixtures are either unnecessary or very simple, the job can often be processed on an abrasive-belt grinder in less time than required to set up a machine tool. Furthermore, the fast-traveling abrasive belt removes a considerable amount of metal per unit of time.

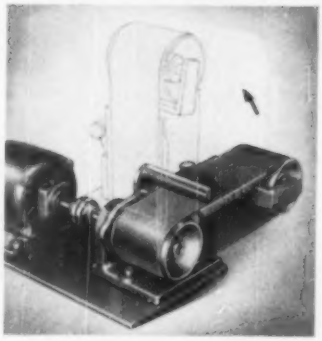
Present machining allowances on many workpieces favor the use of abrasive-belt grinding as the sole finishing operation on many surfaces. For example, small iron and steel castings are currently produced with 1/16-in. finish allowance; large pieces with $\frac{1}{8}$-in. allowance. Diecastings and plastic articles are made to much closer allowances.

Short Grinding Cycle

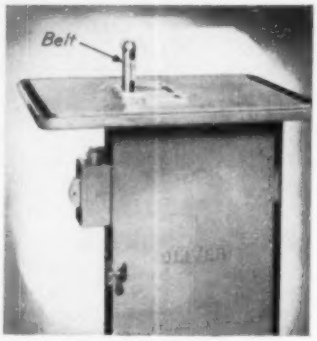
Net grinding time (work contact with belt) for flat surfacing operations is in the order of 10 to 30 sec per cycle, and is the same whether one or several pieces are applied simultaneously to the belt by means of a fixture. An automatic centerless grinder will handle between 1000 and 3000 pcs per hr. Surfaces of revolution on work held between centers may be ground at rates between 400 and 800 pcs per hr.

The "tool cost" per piece is relatively small. Belt life of 4 to 8 hr on an operation is not unusual; the belt may then be down-graded

SURFACE GRINDERS FOR DIMENSIONAL WORK



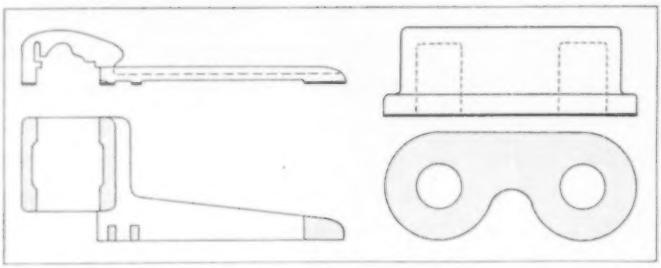
Small surfacing operations are handled on a jobbing or production basis with platen in either position



Inside edges and sharp corners of plastics are ground with a spindle sander

Hand application of work to belt is applicable to light cuts where only flatness is required

Hydraulic control brings table into grinding position, then applies predetermined pressure as operator oscillates table. Or completely automatic operation is possible



Shaded areas are ground to 0.001 in. without distortion. Output: 125 pcs per belt. Material: Meehanite iron

Two aluminum parts are held in a fixture and ground at rate of 550 pcs per hr. Output per belt, 4000 pcs

to a semi-finishing or finishing operation or used for a small-surface job. A worn 80-grit belt may be as effective as a new 120-grit belt. Or, if a belt will no longer cut on platen grinding with hand pressure it will grind another job with power work application.

Other things being equal, belt life is approximately proportional to volume of material removed. Therefore, to realize the most from belt grinding, specify minimum allowances on workpieces, consistent with over-all costs. Also, recess the work surfaces if possible to reduce surface area to be ground.

In wet platen grinding, life of abrasive belts can be extended by resharpening with a belt dresser, and more effectively on silicon carbide than aluminum oxide.

In short, the economy of belt grinding lies largely in faster grinding, less frequent interruption and more production rather than in abrasive cost. Another economy is that the process can sometimes be used to finish a product in two operations instead of three.

Surface Grinding

To grind a relatively flat surface, even a contoured surface where tolerances are close, one ordinarily uses a platen-type machine. The belt runs over a flat or contoured platen, which is hard or resilient according to the cutting action desired when the work is pressed against the belt.

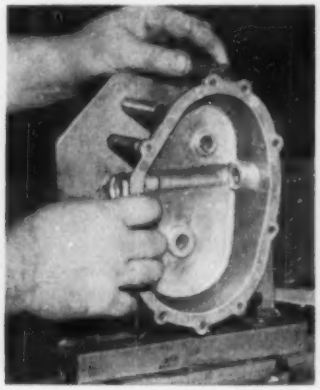
Platen-type machines are built with the belt running in the horizontal plane, the vertical plane, or adjustable as to position. Usually, the production-type machines have a fixed belt position. The smallest horizontal-belt machines will surface and deburr parts as small as a dime; the largest are intended for heavy-duty applications like surfacing valve housings for diesels.

Hand feed is suitable for skim cuts on aluminum and plastics. Power feed is generally used in platen work for surfaces ground all over at once, to specified tolerances and depth of cut.

Often, work is merely laid on the work table and pressed by hand against the downward-mov-

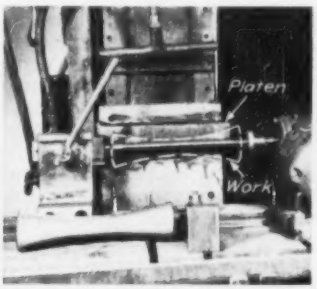
FIXTURES FOR SURFACE AND CYLINDRICAL GRINDING

Fixture oscillation is obtained by rocking the table. Part is located by pins, has some float



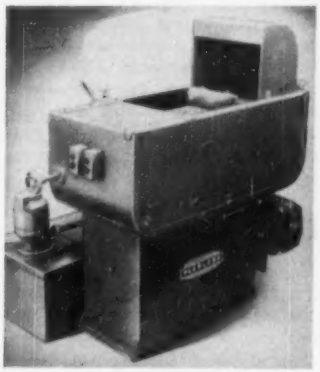
Gear case is supported by plugs and held by a simple snap lock at the top of the fixture

Plunge cutting rubber-covered roll between centers is faster than use of cylindrical grinder

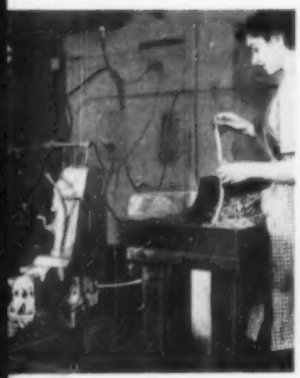


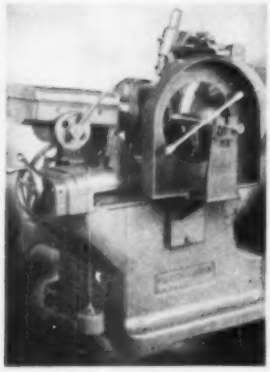
Formed platen (belt has been removed) contours belt while grinding aluminum spool between centers

Power chuck drives tool handle, which operator presses against belt with a loose socket. Platen is channel shaped so belt conforms to work contour

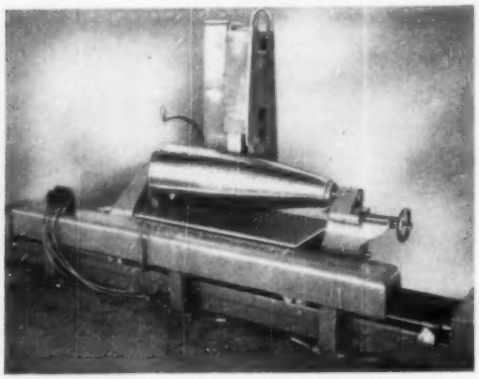


Wet grinding of big work removes dust and quickly produces a flat surface. Large working surface, up to 20x30 in., allows oscillation of large parts. Various materials can be ground on this machine. Forgings and castings are quickly surfaced





Left—Two thousand fountain pen caps (aluminum) are finished per hour with a 400-grit silicon-carbide belt and mineral oil coolant. *Center*—Ends of automobile rim wrenches are polished on a taper feed centerless machine.



Right—Torpedo afterbody section is mounted between centers on a special movable carriage and fixture for contour grinding in conjunction with a centerless machine. This setup improved the product, speeded war effort

ing belt. Or parts may be placed in a fixture and traversed toward and away from the belt by an air or hydraulic cylinder. Depth stops will control relation of the ground face with part's mounting face.

In other cases, the part is placed on pins in a fixture which is then traversed across the belt by pushing or rocking the table. Fixture design is normally simple.

Surfaces of revolution are generated by placing the work between centers and rotating it by power.

Small surface grinders placed around the shop are of greater utility than often realized in respect to miscellaneous burring and flattening operations. A wet-belt platen grinder in the toolroom is a convenience in burring, squaring, chamfering and rounding the ends of bar-stock pieces as they come from the saw.

Centerless Grinding

The principle of centerless grinding has been adapted to abrasive-belt grinding and polishing operations. Straight, stepped-down, tapered and shouldered workpieces can be handled by use of suitable belts and cushion rolls. Articles as small as fountain pen caps or tubes 12 to 15 ft long and weighing 150 lb are finished at high production rates. Machines with backstand units and vertical belt arrangements are used. In one instance, the machine can be used as a platen grinder (feed roll swung aside) with the belt face in either the vertical or horizontal positions.

Various feeding arrangements are employed, according to the make of centerless grinder. Straight round work is moved across the abrasive belt by tilting a resilient feed wheel or a power-driven belt drive. Usually a resilient feed roll is employed when tapered work is being processed.

The abrasive belt may be cushioned by a corrugated belt underneath and traveling with it or by means of a resilient contact roll. Various contact roll or platen constructions can be obtained to obtain the desired grinding action. For example, a softer polishing action is obtained with a channel-shaped platen mounting two contact rolls (work contact is on belt between rolls) than with a single contact roll.

Centerless grinders can be set up and controlled for through feed work, shouldered work and interrupted work. On parts like wrench sockets, through feed carries the workpieces across the belt and they drop into a tote box. Grooved parts like cartridge cylinders for pistols can be ground or polished before bluing. Tubing ½ in. OD can be ground and polished at speeds up to 15 ft per min.

Tandem setups of centerless grinders will perform all of finishing operations required automatically. For example, in finishing steel butt-welded furniture tubing the following machines and steps are used:

First pass—centerless grinder equipped with 240-grit aluminum-oxide belt running over rubber-covered wheel of medium hardness.

Second pass—centerless grinder equipped with 320-grit belt greased with tallow to dull cutting qualities but improve finish.

Third pass—polishing machine with tempico wheel and steel polishing compound.

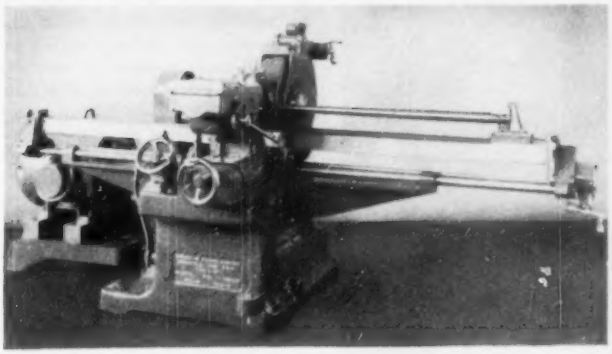
In the case of stepped shafts, as used in golf clubs, the procedure is:

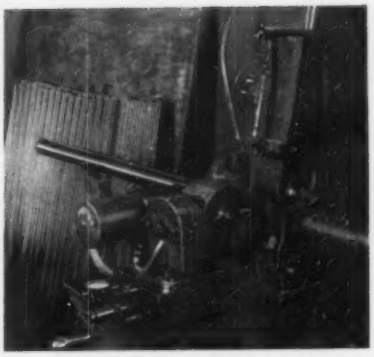
First two centerless grinders—320-grit belt running on a soft buff-type contact wheel to clean the stepped surfaces without cutting down the shoulders. *Third pass*—a sisalin wheel with emery cake. *Fourth pass*—steel polishing compound.

On soft metals like brass, abrasive belts (no matter how fine) will leave a line. For a high finish, a woven belt with an application of tripoli will produce a high-luster finish.

Power loaders have been devised for feeding heavy stock to centerless belt grinders. Work up to 6 in. dia can be handled.

On occasion, centerless belt grinders have been adapted to





Left—Special holding fixture is used on taper feed polishing machine for finishing tapered machine gun barrels. Part rotates in ball-bearing cradles. *Right*—Finishing of steel and aluminum tubing is a growing application of centerless belt grinders. Here 2¼-in. OD steel tubes 40 in. long are ground with a 50-grit aluminum oxide belt with "tool life" of 134 pcs per belt. Production is 76 pcs (256 ft of tubing per hr) or over 4 ft per min

finishing of large articles with specified contours, like torpedo sections and gun barrels. Such machines involve the engineering of suitable fixtures.

Contact Wheels

Cutting action of an abrasive belt is affected by many factors, including the resilience of a contact wheel, when used. Applications of contact wheels are found in these classes of machines: some centerless grinders, behind the working section of vertical free-hand grinders and as the belt-driving wheel of backstand idler assemblies for free-hand grinding.

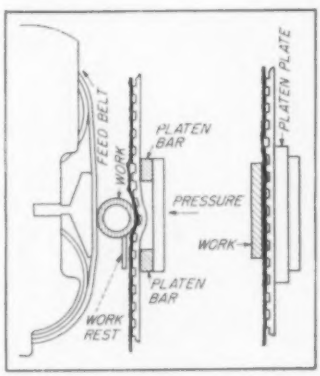
Contact wheels are made of several materials: segmented canvas, rubber, leather, cloth, felt and cork in densities for various purposes. Such wheels are made with a smooth or serrated face. The latter construction flexes the belt for desired grinding action and cleans the belt. Selection of contact wheels depends on the degree of cushioning action desired.

Contact wheels are frequently shaped to the desired contour. If flexing of the belt over one wheel is too severe, an intermediate contact wheel may be employed.

No hard and fast rules can be given for selection of contact wheels. Each application must be considered in relation to the material, what is to be accomplished in finish, the belt speed, effect of coolant or grease on belt cutting action, and the action of the contact wheel itself at operating speed.

Free-Hand Grinding

The abrasive belt is a powerful tool in producing a good finish quickly on a part or cutting it down rapidly in order to save polishing time and labor. The free-hand method of abrasive belt grinding is widely used alone or in tandem with polishing equipment. Dimensional control is not involved, the work being merely manipulated by hand (sometimes by power) against the abrasive belt, which may or may not be backed up by a contact wheel. The latter method is known as "strapping."



Cushioning action of the belt while centerless polishing is achieved by several means: a relieved platen bar, a corrugated cushion belt underneath the abrasive belt, or a cushion wheel instead of a platen

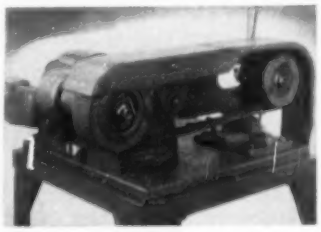
The simplest form of free-hand grinder is the idler backstand assembly, which consists of a polishing lathe plus a suitable contact wheel and an idler backstand. Here the abrasive belt runs horizontally over the contact wheel and the idler pulley. If shop space is at a premium, the pulley can be mounted in a wall bracket. Similar setups can be made with a bench grinder as the power source.

Means are incorporated in the backstand to track and maintain tension on the belt. A weight, spring or power cylinder may be used for the purpose. Maximum cutting ability and belt life are dependent upon proper tensioning.

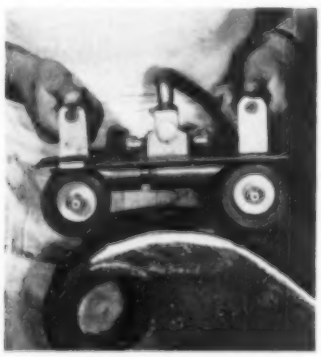
Most work on backstand machines is handled by grinding against the contact wheel. On occasion, however, it is convenient to press the work down on the upper free span of the belt for strapping. And work can be set up on a table under the belt and the belt pressed down on the work surface. By manipulating the table, large area work can be handled in this manner.

Light- and medium-duty backstand machines are frequently built so that the belt can be swung up to the vertical position. By us-

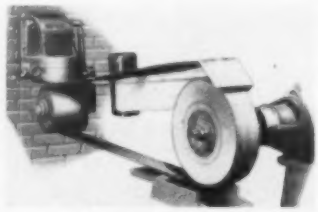
Heavy-duty grinding of contoured work is assisted by a formed contact wheel supporting the belt



Triple-duty bench machine has contact wheel for freehand grinding, a platen for dimensional grinding, and platen is removable for strapping work against free span of belt (with cover thrown back)

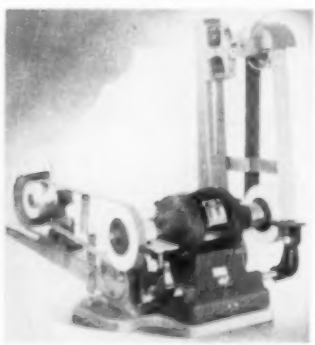


Air-operated belt grinders are used to finish large castings and miscellaneous work where a portable tool must be used



Wall backstands enable conversion of polishing stands to belt grinding where space is limited

Backstands to be set up behind polishing lathes for belt application may have weight, spring or power tension devices. If exact tension is always maintained to take up stretch, maximum belt life will be obtained



Utility service and light production grinding are the functions of these light backstand conversions for a small bench grinder. This type of setup is much used for light grinding, polishing and burring. Narrow belts easily conform to work surfaces

ing a shaped contact wheel, the belt can be made to assume a convex or concave surface as viewed by the operator. Much work is ground or polished with such setups, either against the contact wheel or on the free span of the belt.

Production-type grinder-polishers are also made with the belt running vertically. Here, the advantages are a large saving in floorspace and easy manipulation of various shaped workpieces. A contact wheel is ordinarily used to back up the belt at the point of work application. Wear on the contact wheel is small, because the work is done by the abrasive belt. Where suitable, the contact wheel in combination with the abrasive belt cuts polishing time on contoured work by 50% as compared with the setup wheel, which loads faster, cuts hotter, produces less.

Types of Belts

Cloth-backed abrasive belts for metalworking operations are made in widths from ½ to 24 in., but popular widths range from 2 to 10 in. Lengths range from 21 to 168 in., and longer but the extremely long belts are normally required in only 3-, 4- and 6-in. width. Grits range from 24 to 500.

Cloth backings come in various weights: jeans for light weight; drills for medium and heavy weight. The lightweight jeans cloth is used with finer grits for flexible operation on irregular surfaces. Medium-weight drills are used with practically all grain sizes for operations on flat or nearly flat surfaces. Operations involving exceptionally heavy cutting require belts with a heavy-weight drill backing.

Paper-backed belts can be used for flat surfacing operations if the belt tension can be controlled accurately.

Belts are available in close coating for grinding non-loading materials and in open coating for soft, free-loading materials.

Abrasive grain is held to the cloth backing with animal-hide glue or resin. Use of coolants with abrasive belts necessitates the use of waterproof-bonded belts, except

that oil coolants such as kerosene and mineral spirits can be used on animal-glue belts. A resin bond is said to retain the grain better than a glue bond and therefore to retain cutting efficiency longer. Water and soluble oil can be used with resin-bonded belts.

Choice of Abrasive

Aluminum-oxide abrasive has tougher grain and is more widely used than silicon carbide in grinding the ferrous metals, and is used occasionally for non-ferrous materials.

Roughing of steel parts with aluminum oxide (backstand method, either offhand or fixture grinding) is usually done with 24- to 60-grit cloth belts. Intermediate grinding is handled with 80, 100 or 120 grit, and "oiling out" or final polishing with 180 to 240 grit.

Polishing of flat steel, hot or cold-rolled, and stainless strip and sheet prior to forming is handled with aluminum-oxide coated belts. Rough grinding is done with 60 to 100 grit, finishing in finer grit sizes, normally stopping at 150 or 220. The belts are usually paper-backed and glue-bonded. Treatment of sheet and strip up to 72 in. wide, and blanks for formed articles, eliminates expensive polishing after the product is formed. The flat stock is then given a light resinous coating which protects the material until after forming and prior to plating.

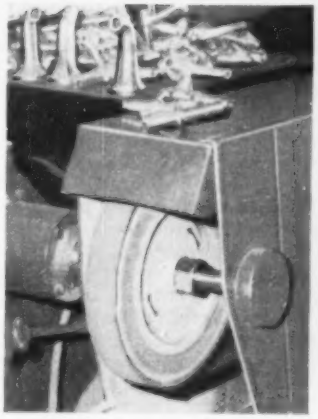
Cloth-backed, aluminum-oxide belts are widely used on platen machines for smoothing ferrous materials. Grit sizes are normally somewhat finer than when grinding non-ferrous metals with silicon-carbide belts. Roughing is done with 50 or 60 grit, and finishing with 150 or 180 grit.

Selection of aluminum-oxide grit for contour grinders, swingframe grinders, etc., is roughly the same as for backstand or platen work.

Silicon-carbide abrasive is sharper than aluminum oxide, but more friable and brittle. It is used in wide paper-belt form for finishing stainless steel to a fine luster. Grit sizes are 100 to 400, depending on finish desired.

On backstand machines, both offhand and contact wheel, and platen

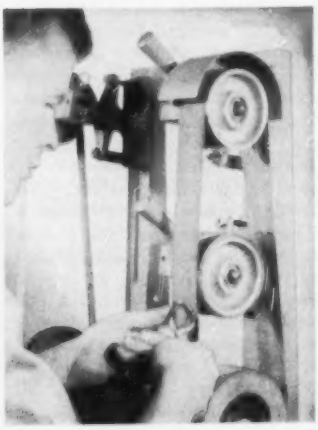
AIDS TO FREE-HAND GRINDING



Super-soft compress wheel, undercut on edges, will round over easily when used as contact wheel on backstand polishing of plumbing goods

"Rolling pin" holder for rounding edges of pliers is used to force belt to conform with contact roll

Formed contact wheel causes belt to curve for grinding concave surface of scissors



A formed contact wheel helps in creating concave belt curvature. The narrow belt is sufficiently flexible to cope with various work curvatures

An indexing workhead can be set up in front of a formed-contact wheel so that non-dimensional polishing of ball cranks and similar articles can be handled

Four-lobed faucet handles are readily polished by using a contact wheel of the proper curvature and a wooden workrest

machines, silicon-carbide cloth belts are used for non-ferrous grinding in these grits: roughing —24 to 36; intermediate grinding —50 to 80, and finishing—100 to 240.

Cutting Speeds

Speed of the abrasive belt controls the cutting efficiency of the abrasive grain. A specific grit works differently at various belt speeds. For example, the finish obtained with a fine grit at slow speed can be duplicated or bettered by substituting a coarser grit run at higher speed. Hence, by taking advantage of this fact, savings can be effected in cost of abrasives and more pieces can be ground faster with the coarse grit.

Belt speed depends on many factors: grinding action desired, work material, machine limitations and safety. For backstand operations, the average speed range is 7000-7500 sfpm. Stainless steel and Monel require 4500 sfpm. Aluminum and bronzes are preferably ground at 3000 to 6000 sfpm, depending on application and finish. Where soft buff-type contact wheels are used, grinding speed ranges between 3,500 to 5,000 sfpm, so that centrifugal force does not destroy the soft action of such wheels. Platen machines and wide-belt polishers operate at 3,500 to 5,000 sfpm. Correct grinding speed for given applications is usually a matter of experiment.

Work Pressure Against Belt

Stock removal with an abrasive belt is approximately in direct relation to surface speed and the pressure applied to the work. That is, if the speed is doubled, approximately half as much pressure is needed. This is a fortunate circumstance, because the belt lasts longer. Then, too, a coarse-grit belt traveling at high speed will produce a finish equal to or better than secured with a fine grit at lower speeds, and again coarse grit has longer life.

Power feeding produces more exact and uniform finishes than hand feeding, but must be adaptable to the application. To minimize operator fatigue in flat surfacing of repetitive parts, some shops use air or hydraulic cylinders to advance the fixture and work to the belt.

Coolants for Abrasive Belts

Choice of coolant depends primarily on the adhesive holding the abrasive grain to the backing, but also on the metal being processed. Glue-bonded belts require an oil coolant—general purpose cutting oil, sulphurized mineral oil, kerosene and mineral spirits. On aluminum, for example, an oil like Stan-I-Cut not only keeps the belt from loading, but also produces a fine finish with a luster higher than secured with a water-base coolant. Oils are used in connection with polishing of stainless-steel sheets during rough and intermediate grinding.

A grease stick is not often considered a coolant, but tends to keep the belt free cutting and free from loading, acts as a lubricating agent and adds greatly to belt life. Plain tallow, applied with care, or a grease stick with a low melting point are both used. Greases are used in final belt-polishing operations to soften the cutting action and produce the high finish desired. This is common practice in backstand polishing and is called "oiling out." Stainless-steel sheets are polished in this manner. Greases are also used on platen machines.

Water-base coolants, such as one part of soluble oil to 100 parts water, have many advantages over dry grinding, but must be used with the more expensive resin-bonded belts. Use of coolant avoids distortion of the work from heat, dust is eliminated, chips are flushed off the work and not carried to the next machine in tandem operations, and a better finish is obtained.

Dressing Abrasive Belts

Loading and glazing of abrasive belts has been encountered in most applications of dry sanding. Conventional methods of removing the load and glaze (regular grinding wheel dressers, wire brushes, etc.) have been used.

Significant increases on belt life and stock removal have been reported for a new dressing device.

Tests have been made with a 36-grit, aluminum-oxide coated belts with waterproof backing. Without dressing, a belt lasted 62 min, removed 1722 grams of cold-rolled steel. Another belt, after a half hour's use, was dressed every few minutes. Belt life was increased to 92 min. Total stock removal was 3142 grams.

Effectiveness of dressing is most effective on 60-grit belts and coarser, but considerable improvement has been obtained from dressing finer-grit belts.

Horsepower Requirements for Abrasive Belts

There is no definite rule for horsepower required per inch of belt width, when used on various materials. But an all-around average figure is 1 hp per inch of belt width. This figure is borne out by a variety of observations.

Where the work is applied mechanically to the belt, as in platen-type installations, aluminum and brass tend to require more horsepower. For example, on an 8-in. platen machine with a 7½-hp motor, stalling speed is sometimes approached. This is true because of the large work area and high work pressures.

It is safe to assume that abrasive belts will not require as much horsepower as buffing wheels of corresponding width. Many shops that do abrasive-belt grinding and polishing also do buffing. Therefore, in most instances their machines are adequately powered for abrasive-belt grinding.

Acknowledgments

We wish to express our appreciation to the following companies for valuable assistance in preparation of this report:

Behr-Manning Div., Norton Company
Carborundum Company
Clover Mfg. Company
Desmond-Stephan Mfg. Company
Hammond Machinery Builders, Inc.
Michigan Abrasive Company
Minnesota Mining & Mfg. Company
Oliver Machinery Company
Porter-Cable Machine Company
Production Machine Company

1950 . . .
Our Industrial Machine Is Running Down

In his recent Economic Report to Congress President Truman chalked up a constructive advance in his economic reasoning. He pointed out that if we are going to attain the worth-while goal of a $300 billion national income in the next five years, we must equip ourselves with more and better industrial tools. Of all the dynamic forces of expansion in America, he said, one of the most important is business investment.

That is fine. It is basic common sense. We have been saying that for years and we are glad to hear the President say it too.

But having hit this new high in his economic reasoning, the President failed to draw the right conclusion. He made the mistake of accepting the false conclusion that there is no shortage of business funds to pay for more and better industrial tools. "There are immense opportunities for business investment in nearly every segment of the economy," the President said, and further, "there are in general sufficient funds available to businessmen who want to seize these opportunities."

That just is not so — and the lack is not only serious; it can well be fatal.

It is a matter of the most urgent national importance that the President's recognition of the need of more and better industrial tools should be followed by effective action. *That calls for changes in the national policies that are now blocking and, unless changed, will increasingly block business from meeting this need. If business cannot get enough new tools, the result will not be higher, but lower standards of living five years from now.*

The President should talk this matter of business investment over with Senator O'Mahoney, the Chairman of the Joint Congressional Committee on the Economic Report. Senator O'Mahoney would take to the discussion knowledge of the investment situation recently acquired through his conduct of a series of Congressional hearings.

If he told the President what he told the press during the course of these hearings, he would say, "the private capitalistic system is being seriously threatened by a lack of venture capital." That is in direct conflict with the President's conclusion that "there are in general sufficient funds available."

This serious shortage of adequate investment in new plant and equipment is brought forth so that all of us can understand it by McGraw-Hill's annual survey of American industry's plans for investment in new plant and equipment in 1950, which has just been completed.

continued on next page

BUSINESS' PLANS FOR 1950

These are the major findings of the McGraw-Hill survey of "Business' Plans for New Plants and Equipment" in 1950. Made by the McGraw-Hill Department of Economics, the survey shows:

1. Industry – as represented by manufacturing, mining, transportation, and utilities – now plans to invest $12.4 billion in new plants and equipment this year. This is 13% less than was actually spent last year.

2. Manufacturing industries alone plan to spend $6.3 billion in 1950 for new facilities. This is also 13% less than they spent last year.

3. Manufacturers as a whole expect their 1950 sales volume to about equal 1949's.

4. Manufacturers will expand their capacity about 3% in 1950, under present plans. The largest part of their funds, 65%, will go to replace and modernize existing facilities.

5. Profits and reserves are expected to provide 92% of the 1950 investment funds of manufacturing companies. These companies count on new common stock issues to provide less than one-half of one per cent of the investment funds they will need.

6. Two out of three manufacturing companies review their investment plans monthly. Almost all companies go over them at least quarterly. The survey shows that companies changed plans rapidly during 1949 to meet changes in their prospects.

7. Other industries are also reducing their investment plans in 1950 by 13%. This coincidence arises from the fact that utility companies, notably the electric light and power companies, plan to spend only slightly less than in 1949. Railroads, on the other hand, are reducing their capital programs in 1950 by more than 40%.

A copy of a complete report on "Business' Plans for New Plants and Equipment" may be obtained by writing me at McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.

The results of the survey, which are summarized above, show that American Industry – as represented by manufacturing, mining, transportation and utilities – is planning to spend 13 per cent less for new plant and equipment in 1950 than it did in 1949.

Since the rate of investment in new plant and equipment right now is apparently about 15 per cent below the rate for 1949, the present level of business investment may be relatively steady in 1950. That would relieve the fear, expressed by President Truman in his Economic Report, that "if the downward trend in business investment were to continue, our prospects for full recovery and continued expansion would be seriously endangered."

BUT, at the rate of investment planned by American manufacturing industry for 1950, it would take 40 years to modernize thoroughly our present industrial plant and equipment. That would still leave undone the job of increasing it to meet the needs of an expanding economy of the kind sketched by President Truman in his message.

In attaining even this rate of investment, the McGraw-Hill survey shows American business must rely overwhelmingly on its own profits, which have declined as the country has left the postwar boom behind it. Most American companies cannot sell new common stock except at ruinously low prices. Here is one case where government action is really needed to help business and help to keep a rising American standard of living.

In order to get enough business investment to assure the "full recovery and continued expansion" sought by the President, our country needs:

1. Lower taxes on business income so as to release more money for new plant and equipment.

2. Liberalized depreciation allowances on old plant and tools so that business can buy new equipment faster.

3. Repeal of the present double taxation of dividends which now are taxed once as corporation income and again as personal income.

It is encouraging to have the President explicitly recognize the key importance of adequate business investment in providing steadily expanding prosperity. The next and most important thing to do is to make this recognition effective by discarding national policies which are blighting an adequate volume of business investment.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

SECTIONAL DIES CUT COSTS

Splitting the die lowers the manufacturing cost of press tools and, where the method can be used, will provide a marked reduction in maintenance expense

BY J. R. PAQUIN, Tool Engineer, UNDERWOOD CORPORATION

FOR numerous parts, sectional dies provide several advantages over the more commonly used solid construction. Among these are:

1. Far less distortion and warpage occurs in hardening; and whatever slight distortion is given to the sections can be easily corrected by grinding.

2. The avoidance of difficult, and therefore expensive, machining where the die opening is very irregular.

3. Quick replacement of frail die inserts is possible in case of breakage. This obviates the necessity of replacing the entire die, as would be the case with solid dies.

4. No cracking is experienced in the hardening operation. Solid dies usually represent a high investment in labor when they reach the hardening operation and cracking during heat treatment means a severe loss.

Application of a few simple rules and an understanding of the various classes of sectional dies will enable the die designer to evaluate any proposed design for sectioning possibilities.

Rule 1: The break line should never be made tangent to an arc.

Application of the rule is shown in Fig. 1. It will be seen that if the breakline is placed as at *A*, a weak condition exists at the sharp projections *C*. These rapidly become nicked or broken, and the die is soon ruined. A break line through the center of the arc, as at *B*, is preferable.

In Fig. 2, there is shown an incorrect method of breaking a large sectional die. A preferred method is illustrated below where all sections are made either straight or curved. This renders the machining of the sections less difficult. Note that the sections are relieved at angle *C*. This makes fitting the sections easier, as less area must be ground. The die illustrated is a composite section with a tool-steel cutting face welded to a machine-steel base, as shown in the sectional view.

Round Sectional Dies

When a considerable extent of the part outline is circular, the construction shown in Fig. 3 fulfills the requirements of low cost and extreme accuracy. All parts can be ground after hardening. The tool-steel block *A* is machined for screws and dowels, and the center hole is bored. Then the block is hardened and subsequently ground on the bottom, and the hole internally ground to size. Segments *B* are machined, hardened, ground, and placed in position. The assembly is then screwed and doweled to the punchholder of the dieset. The hole in the dieset is made slightly larger than the part opening to allow the blanks to drop through. Top surface of the die is ground after assembly of the unit.

Many small parts of intricate contour can be blanked in round sectional dies. For the partial-ratchet wheel shown at *A* in Fig. 4, a two-section die is made, the die being broken at the flat land of one of the teeth. Where the two halves of the part are symmetrical, as at *B*, the section line splits the part opening in two, so that the two halves can be machined and

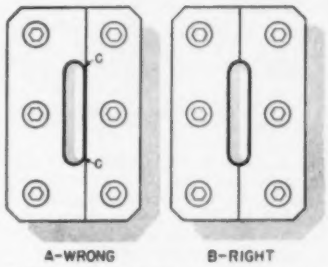


Fig. 1.. A break line should never be made tangent to an arc as at *A*, because it leaves weak projections. Split the die through the center of the arc, as at *B*

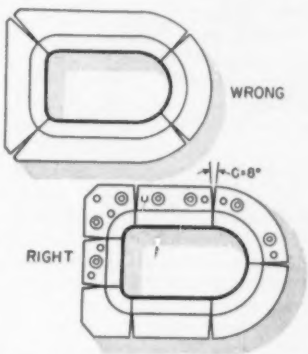


Fig. 2.. A large sectional die should not be split through the corner arcs, as above. Use break lines as shown to reduce machining problems

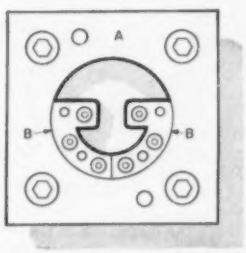


Fig. 3.. Segments *B* are fastened to the punch holder for blanking parts with circular outlines

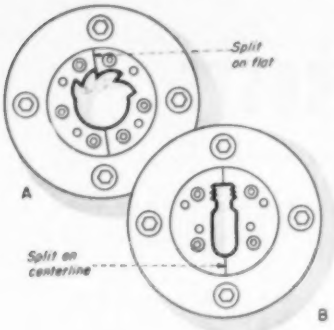


Fig. 4.. If a part is irregular as at *A*, the round sectional die is split as at a flat land. For a symmetrical part as at *B*, the die is split through the arc, and the two sections are ground together to identical dimensions

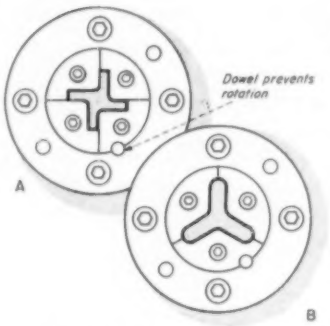


Fig. 5.. Part shape dictates four sections at *A*, three sections at *B*

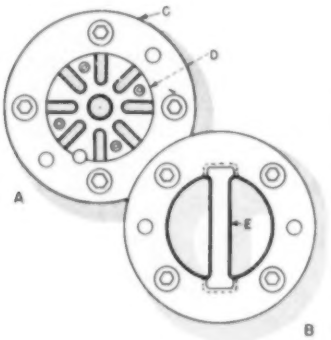


Fig. 6.. Center-plug *D* in the lamination die is made in insert form and is conveniently machined. Fitted insert *E* in die *B* has shoulders at either end to prevent pulling out

ground while clamped together.

The part shape will occasionally dictate the use of multiple sections. Four identical sections make up the die at *A* in Fig. 5, while at *B*, the shape of the part is such that a three-section break is the most economical.

Fig. 6, at *A*, illustrates a round sectional die used for piercing radial slots and the center hole in laminations. It consists of the tool-steel ring *C*, and the center plug *D*, in which the slot openings and center hole have been ground after hardening. A die for punching out two semicircular openings in a piece-part is shown at *B*. It makes use of a fitted insert *E*, which has a shoulder at the lower side to prevent it from pulling out.

Square Sectional Dies

Square sectional dies are widely used for punching square and rectangular holes, and for producing parts which have several straight portions in their outlines. Solid dies with square or rectangular openings are subject to cracking in the hardening operation, because of stress concentration at the sharp corners.

Fig. 7, at *A*, shows a die for punching two square holes and one rectangular opening in a piece-part. It consists of four tool steel members *C* and the center block *D*, both hardened and ground. Unlike the round dies described, which are "set on top" of the die-holder and held in place by screws and dowels, these square components are "set into" in a milled recess in the dieset. Wedges are commonly used to prevent the die components from spreading under the cutting pressure. The die shown at *C* is similar to the one just described. It pierces four square holes in the piece-part.

The dies shown at *B* and *C* in Fig. 7 are also square sectional tools. The one at *B* pierces six rectangular holes in a part, while the die at *C* punches four square holes of a different arrangement than a similar one previously described.

Fig. 8 illustrates a sectional die ... pierce long slots in a piece-part. The sections are set into a recess milled in the machine steel block

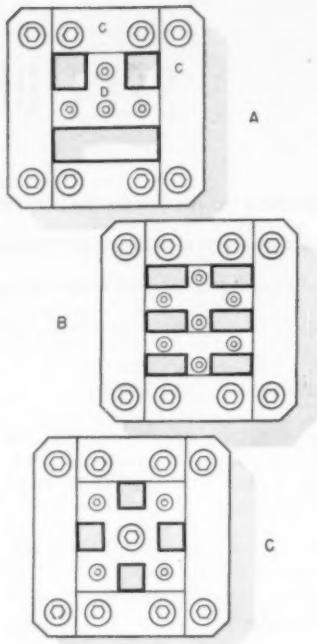


Fig. 7.. Various groupings of square and rectangular holes can be punched with square sectional dies. The insert can be solid as at *A* and *C*, or split as at *B* and is simple to make

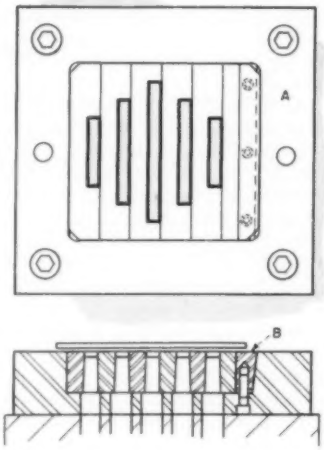


Fig. 8.. Sectional construction of a die for piercing slots minimizes machining problems

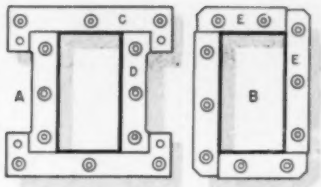


Fig. 10.. Low-production die *A* is not set into the dieset, and clamping members *C* prevent the long members *D* from spreading. High-production tool *B* is set into the die holder, and the blocks *E* can be positioned accurately

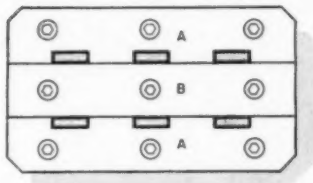


Fig. 11.. Die openings for piercing rectangular slots are machined in members *A*, and member *B* is a spacer of proper width

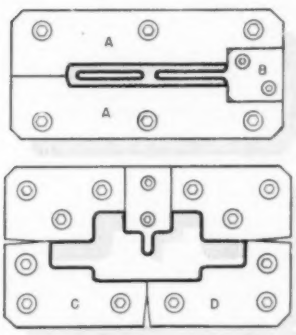


Fig. 12.. Insert *B* is easily replaced in case of breakage. Fig. 13—Sections are relieved for easy fitting

A. Wedge *B*, pulled down firmly by screws, locks the sections in place and prevents spreading under the cutting pressure. The entire assembly is screwed and doweled to the surface of the die holder.

Fig. 9 shows a two-section die, and illustrates how the sections are set into the die holder, held down by screws, and backed up with a wedge to prevent the sections from opening under the cutting pressure. The corners of all such dies are chamfered to a 45° angle, as shown, to clear the radius left by the end mill in machining the recess.

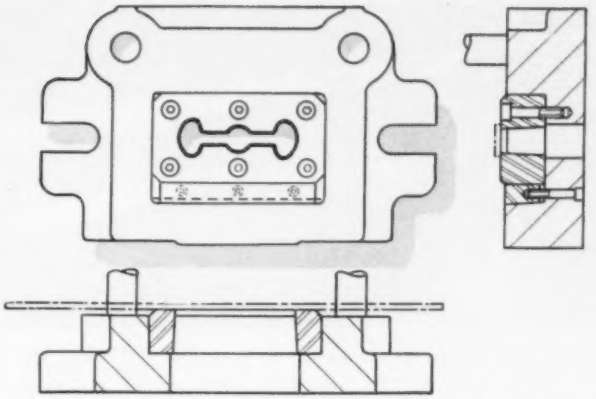


Fig. 9.. Die sections are chamfered at 45° to clear the corner radii in the die shoe, these radii being left by the end mill

Square and Rectangular Blanking Dies

The die shown in Fig. 10, at *A*, is used for blanking parts of rectangular shape. It is not set into the dieset; the clamping members *C* hold the long side components *D* from spreading during the cut. The short members are always used as clamps, as the greatest amount of side pressure is exerted against the long members *D*. Such dies are used only for low-production runs, and as temporary press tools.

At *B*, Fig. 10, is shown a rectangular sectional die for long runs. It is made up of the four components *E*, arranged as shown. This allows setting the blocks to the exact opening required and obviates the necessity of accurate machining of the members. The assembly is set into the die holder, as in Fig. 9.

Another dieset sunk into the die holder is shown in Fig. 11. Designed to pierce two rows of three slots in a part, the tool is composed of the two slotted members *A* and the straight piece *B*. This type of construction is obviously far less expensive and easier to harden than the solid type of die would be.

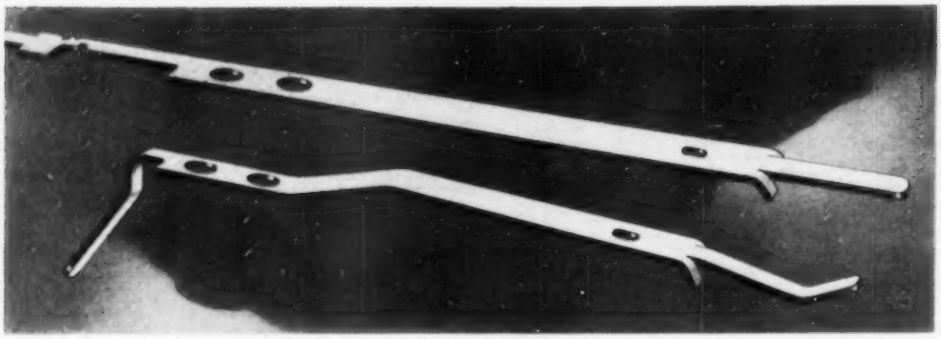
The piece-part shown in Fig. 12 would involve a very difficult die-making job in solid die construction. A sectional die presents few difficulties. Two members *A*, and the easily machined insert *B* for the frail projection, are used. This insert is quickly replaceable in case of future breakage. The assembly is set into the die holder and backed up by wedges.

The sectional blanking die shown in Fig. 13 also has an insert for a slender projection, and is composed of four sections, relieved for easy fitting, and set into the dieset.

From the foregoing examples, it can be seen that numerous cases exist where sectional construction will lower the cost of press tools. This does not mean that solid dies should never be used. In many cases solid construction will still be the cheapest and best way to do the job.

Plastic Hose

GM OF CANADA has developed its own vinyl-plastic hose for carrying coolants to welding heads, gas to soldering torches and air to pneumatic tools. The hose lasts 4 or 5 times as long as conventional hose, costs only half as much, has greater flexibility and smoother surface inside, permitting use of smaller sizes. A 9/32-in. hose replaced a ½-in. rubber one on a pneumatic impact wrench, for example. Buick, Olds, Harrison Radiator and Frigidaire in the U.S. are adopting the idea.



Contact spring was produced at 88 pieces per hr. With proper setup for high-speed operation, output jumped to 150 pieces per hr. Spring is made of nickel silver Rockwell B-100

HOW TO BOOST THE OUTPUT OF MULTIPLE-SLIDE PRESSES

PART 2 ... AUXILIARY EQUIPMENT

No improved method is a success unless workers can be sold on its advantages . . .

Auxiliary equipment will make the operator's job easier despite a shorter press cycle

BY OTTO C. HELD
Production Engineer, Queens, N. Y.

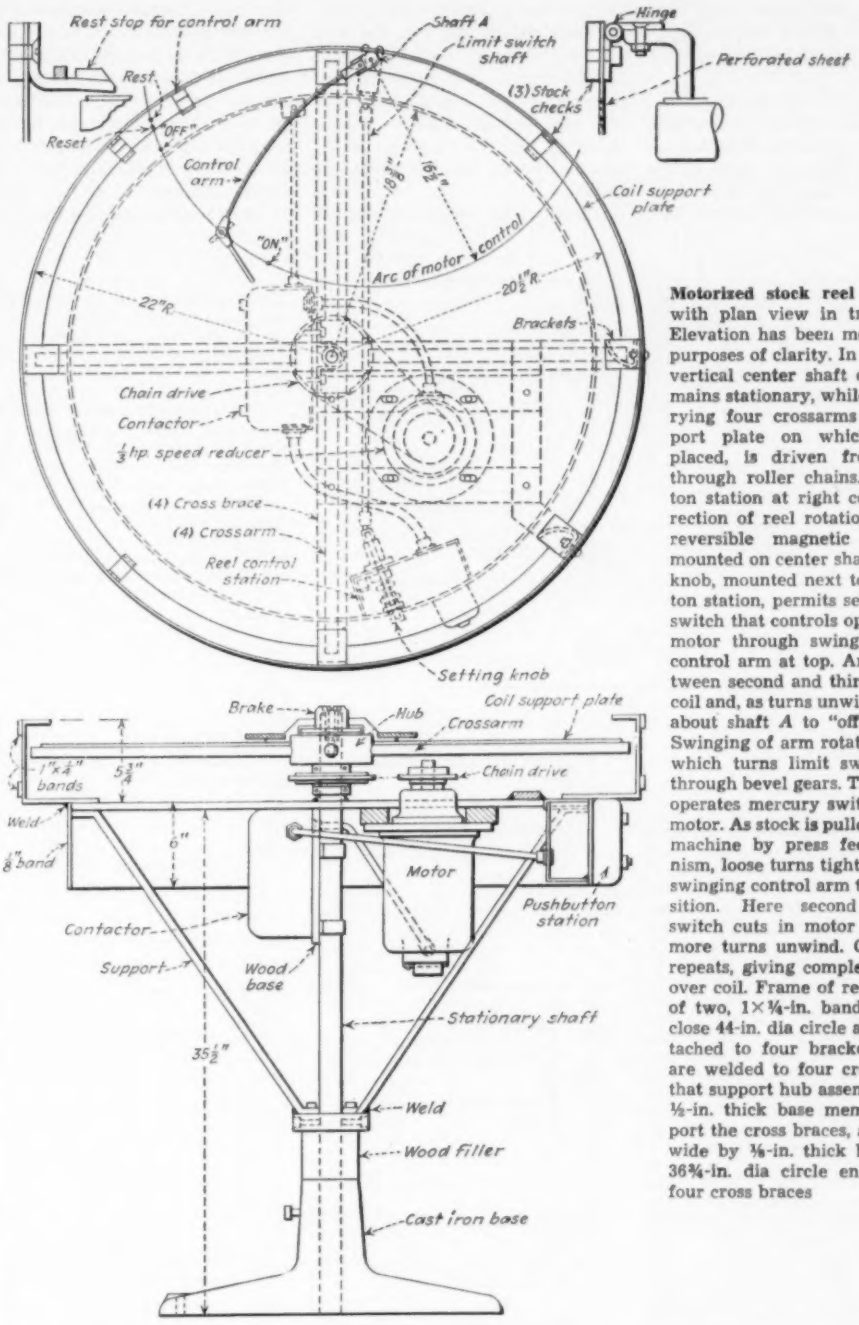
ALTHOUGH tooling can be designed to permit a 100% increase in the speed of multiple-slide presses, the production increase will fall far below this figure unless management installs proper auxiliary equipment. This is true chiefly because of the increased physical demand upon the operator if press speeds are increased without a corresponding reduction in the work to be done by the operator. To enable the operator to keep up with the press with no more effort than was required under the old setup, the operating routine should be planned in accordance with motion-study principles and full auxiliary equipment should be provided.

Motorized Stock Reel

First in sequence is the stock reel. For high-speed operation this should be a motorized unit. As fast-cycle work demands that the operator direct much of his attention to the performance of the press tooling, it is asking a lot to expect him to keep an eye on the stock reel also. Yet, considerable trouble can develop at this point if the reel is not powered. On such setups the machine feed mechanism, as it goes through its reciprocating feed motion, must accelerate the reel almost instantaneously. This can result in the feed knife slipping on the stock, producing a misfeed, and causing considerable damage to the press tooling. To avoid these dangers, a special motorized stock reel has been designed to provide features that are ideal for multi-slide operation.

The reel operates automatically through limit switches to unwind the two outer turns from the coil. Tension on the machine feed and tangling of the stock thus are prevented. Both of these conditions are important in preventing misfeeds and tool mishaps.

Slitted stock must be run with the slitting burr facing only one particular side, as stresses set up during the slitting operation otherwise will cause deformation of the finished part. As the stock may come rolled with the slitting burr



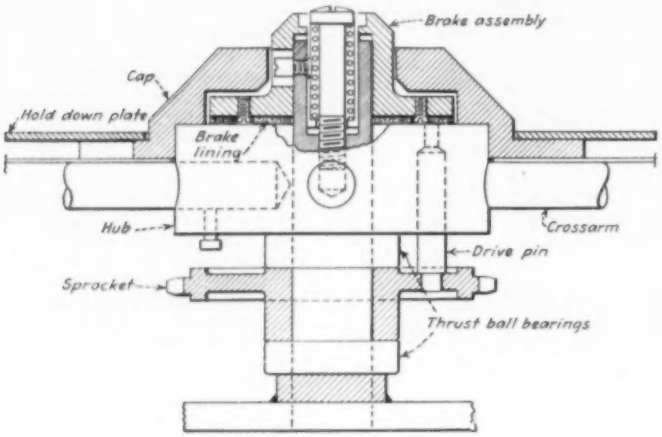
Motorized stock reel is shown with plan view in true detail. Elevation has been modified for purposes of clarity. In operation, vertical center shaft of reel remains stationary, while hub, carrying four crossarms that support plate on which coil is placed, is driven from motor through roller chains. Pushbutton station at right controls direction of reel rotation through reversible magnetic contactor mounted on center shaft. Setting knob, mounted next to pushbutton station, permits setting limit switch that controls operation of motor through swinging motor control arm at top. Arm fits between second and third turns of coil and, as turns unwind, swings about shaft *A* to "off" position. Swinging of arm rotates shaft *A* which turns limit switch shaft through bevel gears. This in turn operates mercury switch to stop motor. As stock is pulled through machine by press feed mechanism, loose turns tighten on coil, swinging control arm to "on" position. Here second mercury switch cuts in motor until two more turns unwind. Cycle thus repeats, giving complete control over coil. Frame of reel consists of two, 1×¼-in. bands that inclose 44-in. dia circle and are attached to four brackets, which are welded to four cross braces that support hub assembly. Four ½-in. thick base members support the cross braces, and a 6-in. wide by ⅛-in. thick band on a 36¾-in. dia circle encloses the four cross braces

either inside or outside the coils, it sometimes is necessary to reverse the rotation of the stock reel. This may be done simply by turning a selector switch at the reel control station.

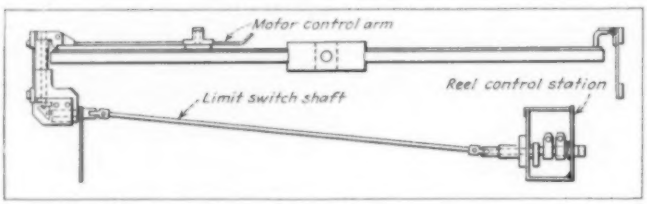
For automatic operation, a control arm linked directly to the limit switch shaft is hooked between the second and third outer turns of the stock. When the turns expand as the stock is unwound, and as they contract when the unwinding motor is idle, the control arm moves between two predetermined limits. At each end of the arc, the arm operates mercury switches which in turn start or stop the motor that drives the reel. A setting knob at the reel control station permits changing the "ON" position of the control arm by simply turning the knob.

Should it be desired to run the reel without full automatic control, the arm can be moved to the "rest" stop near the reel guard, and the mercury switches will be inoperative. With the arm in this position, a special Microswitch bridges the circuit and resets it for control by on-and-off pushbuttons. In this way the reel can be operated within arbitrary limits from the pushbutton station.

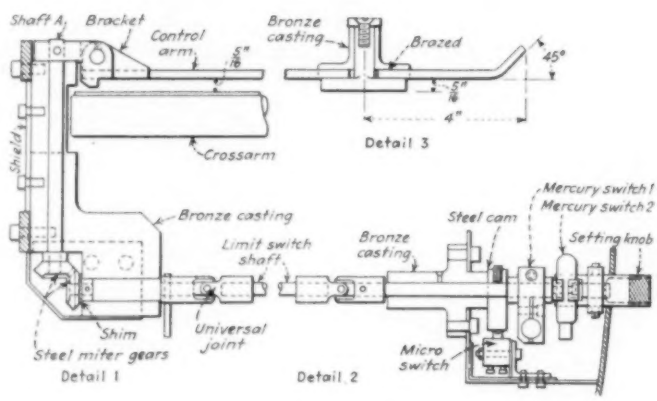
The speed of the reel should be



Hub assembly rides on thrust bearing and is pin-driven from sprocket, which has separate thrust bearing. Crossarms are light press fit in hub. Screw in center shaft adjusts pressure on spring that holds brake assembly in contact with top surface of hub. Set screw secures brake to shaft. Brake is not needed when reel operates under motor control, so screw normally is loose. If motor is "off" and stock is removed by press feed mechanism, brake is set to prevent unwinding too much stock, thus avoiding dangerous tangles. In loading, cap is removed from hub, while coil is positioned, and then cap is replaced. Cap centers coil, and plate holds down turns that tend to spring up. Compact design of hub makes it easy to load coil on reel



Motor-control mechanism is actuated by spring-steel control arm, silver soldered to bracket linked to shaft *A* (detail 1). Shaft rotates in bronze casting to drive 24-p, 24-t, 1 in. pd gears. Motion is transmitted through shaft and universal joints to reel control station (detail 2). Carrier for mercury switch No. 1 is clamped to shaft in position approximately 90° to switch No. 2. No. 1 is "off" switch and always remains in same position. No. 2 "on" switch can be turned slightly on shaft by knurled setting knob. This changes "on" position of control arm. Steel cam actuates Microswitch to bridge circuit and to reset control for pushbutton operation when motor control arm is in "rest" position. Knob is hollow and knob, spacers, and carriers are aluminum to hold weight to minimum and reduce bearing pressure, as mechanism must be sensitive. Follower of motor control arm (detail 3) is 2×¼×5/16 in. bar that rotates freely in casting. Weight of casting plus 4-in. extension helps hold down springy turns of coiled stock



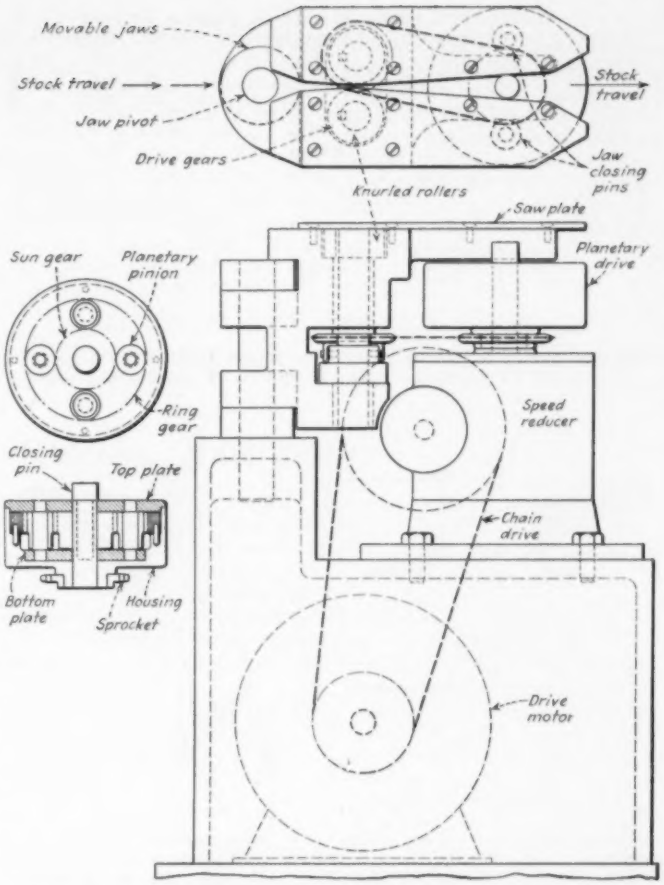
selected so the motor operates almost continuously, peeling off stock at just the right speed to avoid all tension on the feed mechanism of the press. Speed changes are accomplished by changing the driving or driven sprockets. As the cap, brake, and hub assembly can be removed easily, sprockets can be changed with little difficulty.

Should it be necessary to run the stock reel without motor drive, the drive pin can be removed to disconnect the driving mechanism and the reel rotates on a special ball-bearing in free-wheeling fashion. Otherwise, this bearing is not in action. It is in this type of operation that the reel brake is used.

Auxiliary Feed Mechanism

A second piece of equipment that is extremely important in high-speed work is an auxiliary feeding device. It is obvious that, as press speeds increase, the periods of clearing and reloading the machine fall closer together. What many engineers fail to realize is that considerable physical exertion is required if all elements of this operation must be performed manually. At conventional speeds it is no hardship for the operator to pull stock into the press by hand, but on fast-cycle setups, for which the operation must be repeated much more frequently, the labor involved cannot be overlooked. To offset operator fatigue, a specially designed auxiliary feed mechanism should be installed.

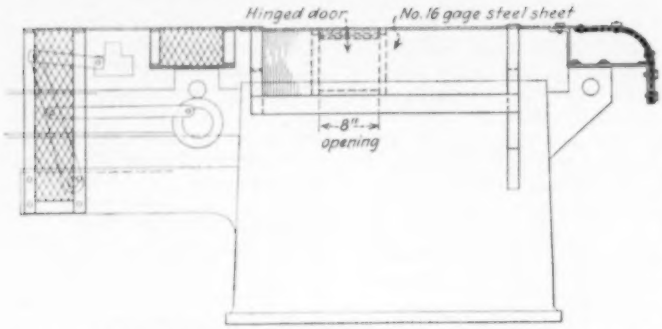
With this device, the operator simply drops the stock end through a slot in the feeder and leans against the starting bar located about knee-high along the front of the machine. A planetary differential device then forces two motor-driven, knurled rollers toward each other so they grip the stock and advance it toward the press at the rate of approximately one fps. The operator has both hands free to guide the stock safely through the straighteners, oil wiper, machine feeder, stock check, and on into the dies. Because the auxiliary feed mechanism clamps and pulls the stock, the operator can give his undivided attention to the proper positioning of the strip.



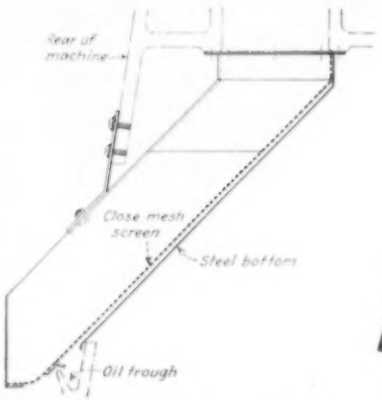
Auxiliary feed mechanism draws stock through opening between two movable jaws. Planetary drive sets up rotative force in two pins that press against the movable jaws and cause them to move about pivot. Jaws carry two revolving, knurled rollers toward one another until they grip stock, causing it to advance. Action of planetary drive is ideal, because, as stock offers greater resistance to motion, drive pins automatically exert increased force on jaws and improve grip of rollers. Planetary unit is powered by ¼-hp, 1800-rpm motor through 9-to-1 ratio speed reducer. Sprocket keyed to planetary unit drives sprocket on first roller shaft. Gear on first shaft drives gear on second shaft to power other roller. Total movement of rollers is approximately 0.010 in. Planetary gearing (detail 1) has sun gear keyed to gear-reducer shaft, with four planetary pinions rigidly mounted to top and bottom plates (detail 2). Plate assembly rotates within housing and ring gear is attached to housing. Drive pins are mounted on plate assembly. As frictional load comes on the device, planetary pinions cause plate assembly to rotate and pins thus act upon movable jaws

When the operation is complete, simply releasing the starting bar stops the feed motor and permits the rolls to withdraw from the strip.

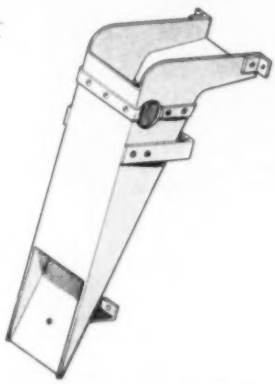
Should it be necessary to reverse the direction of stock feed—as would be the case should the stock strike an obstruction in moving into the press—it is only necessary to change a selector switch mounted above the machine to change the direction of stock movement. The auxiliary feed mechanism thus



Machine guards should be sectional to permit quick removal so tool elements can be serviced readily. Hinged doors speed slug removal.



Parts chute should have screen bottom to permit oil to drip through to plate. Oil runs to trough and is collected for reuse. Chute is 7¼ in. wide



Scrap chute is made of No. 18 sheet steel and must be constructed with all surfaces smooth for good results

conserves the operator's energy and permits him to direct more attention to the quality of the work he is producing. In this way, rejects are avoided and, under an incentive payment plan, operator earnings are increased.

Scrap and Part Chutes

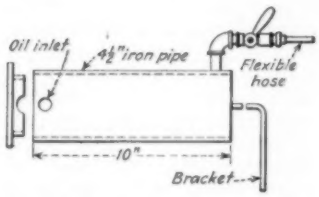
After the slugs are punched from the strip, they are forced horizontally back through the die, die plate, and back plate. But in the hollow of the back plate they tend to pile up. Therefore, once in each cycle the operator must go to the rear of the machine and guide the accumulated slugs by hand into the scrap chute. The tote pan at end of the chute should hold all slugs that are punched out in one shift. Finished parts drop through a chute into a bin located at the rear of the machine next to the scrap bin.

At the end of each cycle, a strip of material 4 to 5 ft long remains in the machine and must be removed to clear the press for reloading. After extracting this strip, the operator should examine it closely, as the condition of the strip reveals the condition and operating efficiency of the tooling. The operator then should fold the strip in the middle and drop it in a bin large enough to accommodate all strips from one shift. This bin must be located below the stock straighteners for ease of disposal without any waste motion by the operator. Consideration of these points speeds the operating routine.

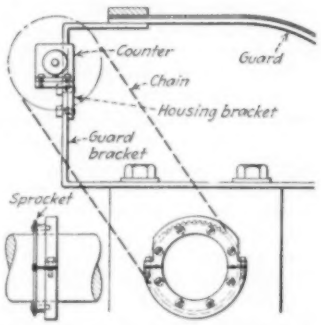
Tool elements and machine parts, such as die sets, back plates, cam slides, and form tool sets, for multi-slide machines are too heavy for manual handling. A 500-lb hoist should be installed on an I-beam above the press. Elements then can be raised, lowered, and easily moved away from the machine, with minimum danger to the operator's health and safety.

Oil Recirculation

As all tooling must be drenched with oil twice in each cycle, a considerable volume of oil flows over the machine. Eventually, some runs down the sides and creates a nuisance and a waste unless provision for recovery is made. Troughs should be installed along the base of the machine to catch spillage, which then should be piped to a receiver, filtered, and pumped back to a tank above the machine. A long, flexible hose on



Oil reservoir is mounted on press above tooling and has flexible hose to permit rapid oiling of die sets



Standard reset revolution counter is driven from front or rear camshaft by ladder-steel chain. Drive sprocket is drilled and reamed for ⅛-in. pin, then split between teeth with saw

the tank makes it easy to oil all tools quickly.

Guards and Platforms

As multiple-slide machines have many moving elements, protection of operating personnel is a major consideration. At the same time, thought should be given to designing protective devices so they retard operations as little as possible. Perforated sheet metal guards should be supplied in sections that can be removed quickly. To speed slug removal and extraction of end strips, hinged doors can be provided in the guard. And tools and elements that require maintenance must be easily accessible.

A wooden platform is recommended for the operator so he can watch production and service the machine from above. The platform should be approximately 10 in. high, 24 in. wide, and 4 ft long, with steps on each side.

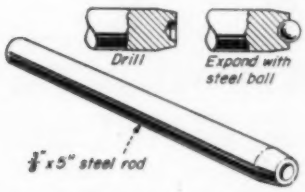
Counter Arrangement

When multiple-slide presses are operated on an incentive-pay basis, an accurate count of finished parts must be obtained. A counter will show exactly what was produced during any time period. The counter shown is rotated by a light chain from a sprocket on the rear cam shaft. The counter itself is a standard purchased item.

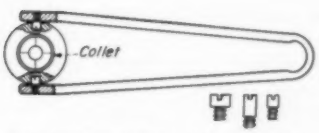
(Part III of this series will appear in a forthcoming issue—Ed.)

Short Cuts FOR THE SMALL SHOP

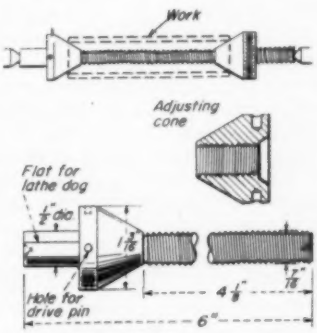
BY CHARLES L. LEEPER



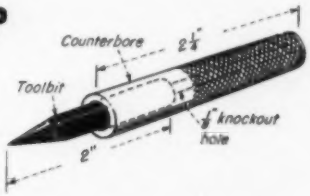
RIVET SETS, either casehardened carbon steel or heat-treated tool steel, can be made up when needed with little expense and labor. Take a piece of stock of the required dimensions and drill a hole in the end. Heat the end to a cherry red and drive in a steel ball to produce the spherical seat that forms the rivet head. Bevel the OD of the tool and dress off the end until it will form the correct height of rivet head.



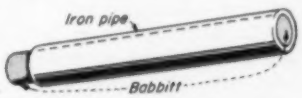
PIN WRENCHES with two pins actually take a better grip than the conventional type, and will not ovalize the holes. The two pins should be made up in sets of various sizes for interchangeable use in the hinged members of the tool. It is, of course, essential to drill and tap the mounting holes at an angle in the tool members, so that the pins properly engage holes in collets, locknuts, etc. A radius ground or filed into the tool arms near the pins is necessary to provide clearance for the work.



AN ADJUSTABLE MANDREL to be used between centers while machining the OD of bushings and tubing should be available in several sizes besides the one illustrated. This two-part device consists of a threaded shaft with integral cone and a separate adjustment cone which screws onto the shaft. Rear of the adjustable cone is counterbored to fit the tailstock center. Thus, when the workpiece is too long to mount the mandrel between centers, the adjustable cone may serve as a female center.



HEAVY - DUTY prick punches may save much annoyance from wearing or breaking off of the point. To make a good punch, chuck a piece of ⅜-in. cold-rolled steel and drill a ⅛-in. through hole. Counterbore one end ¾ in. deep and to a diameter 0.002 to 0.003 in. less than the diagonal of a 5/16-in. toolbit. Grind points with various tapers on several bits and drive them into this style of holder. When a particular bit is sharpened back too close to the tool shoulder, drive out and replace, or insert a ⅜-in.-long plug in the counterbore and replace the short bit.



SOFT - FACED PUNCHES are useful and necessary when driving hardened shafts, gears and the like. A "babbitt punch" is a safe tool for this work. To make one take a piece of pipe and fill with babbitt. Then turn off the pipe for about ½ in. to expose a babbitt face. When the end mushrooms, turn off more pipe.

ROUND TABLE

Cache or Confess?

"Al, tell me: What do you do about spoiled work?"

"Spoiled work?" replied Al. "What d'you mean?"

"Maybe I didn't make myself clear, Al," returned Ed. "The point is this: What do you do in order to have the men come to you when they spoil a job? Or do you turn your back while they throw it out of the window so you won't see it?"

"To tell you the truth, Ed, I haven't given that phase of it a moment's thought. I've always considered that the work would be done and that's all there was to it."

"But, Al, you have to face the facts. You know darn well that some work is spoiled, and if I know human nature it seems that the spoiler will conceal something. Unless some understanding is reached between the foreman and his men, there is certain to be deception."

"You mean, Ed, that you'd like to know if any spoiling is being done?"

"Certainly! Of course we know that the spoiling is not done on purpose, but I feel that a foreman should know about it; don't you, Al?"

"What good's it going to do, Ed?"

"Caching damaged work is decidedly a form of dishonesty and everything should be done to discourage that."

"It's pretty hard to expect a fellow to admit being a poor workman when he's trying his best."

"Of course such a thing doesn't happen very often, but when it does I'd like to know about it —I don't like underhanded practice."

"Have you anything in mind, Ed, as to how to discourage the practice?"

"Yes, I have Al. I've decided to have a conference with each of my men—won't take but a matter of minutes for each fellow—and tell them that I want them to shoot square with me and let me know what happens every time they have difficulties."

"That's all very well, Ed, but you know how some fellows are. They hate to admit a wrong and caching away something damaged is a form of covering their damaged ego."

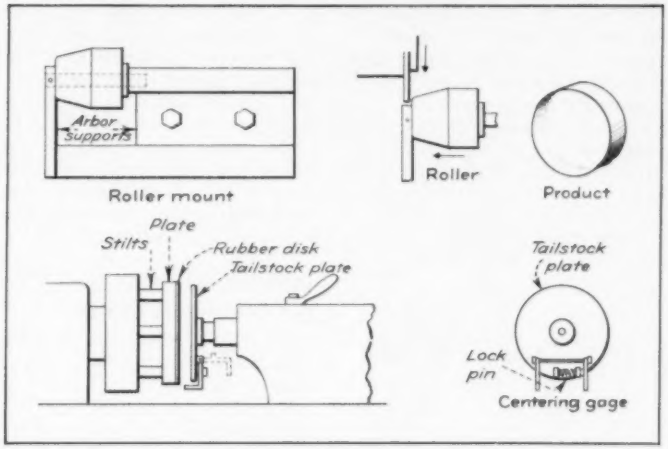
"All the same, Al, I am taking the stand that I want to know everything that goes on in my shop—good work or bad."

"In other words, my friend, you're trying to make your men over."

"Not make them over, Pal—make them."

***HOW CAN A MAN'S PRIDE** be protected and spoilage be controlled simultaneously? Or can both be done? In his supervisor's attitude the key? Your ideas or opinions on this subject will help others. Discussions of earlier topics appear on later pages.*

Practical Ideas



Spinning-Lathe Job Produces Large Flanged Covers

A SHORT RUN of flanged covers of 12-gage mild steel was handled without dies—which would have been too expensive—on a lathe in a spinning setup.

First a 1½-in. plate was cut out just larger than the 15-in. dia required on the work, was mounted on stilts to the lathe faceplate, and was turned down to the required diameter. Then a ⅛-in. rubber disk, somewhat smaller than the plate, was cemented to it. A matching ⅜-in. plate was cut to a 14⅞-in. diameter and mounted on a thrust bearing in the tailstock of the machine.

The plate in the tailstock carried a centering gage, made of rods and pins. This was a U-shaped affair with the ends of the U bent at right angles to the body. Pivoted on the rear side of the plate, the gage was arranged so its arms extended under and beyond the plate where they would stop the workpiece from dropping to the ways of the lathe. The gage, after it was placed right, stopped the work in just the right spot where it would be centered when the tailstock was moved up to the faceplate extension. A spring-loaded pin locked the gage back out of the way when the lathe was operating.

A welded support, bolted to the compound, carried a welded-up frame that supported a tapered roller. This was held on an arbor that was supported at both ends for strength. The taper on the roller was cut at 20°, and was long enough to get a good grip on the stock. A straight section of the roller behind the taper was slightly longer than the developed length of the flange.

One pass with the longitudinal feed of the carriage was enough to form the flange smooth and chatter-free. In production, the total time for one part was only 1½ min. *Lester J. Scholl, Jacksonville, Fla.*

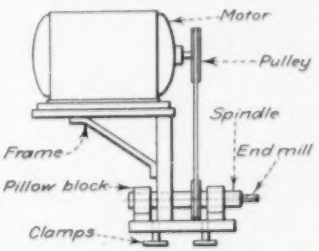
Lathe-Milling Attachment Cuts Leadscrew Threads

LIKE MANY shops we have an extra lathe that is not used too frequently. Recently we needed a quantity of leadscrews, so we tried to find a way of making them that would employ the lathe—leaving other equipment free for jobs in process. Here is what we figured out:

A welded frame and mount was made to fit on the lathe compound and to carry a ¼-hp motor. This was fitted with a V-belt and sheave that drove a shop-made spindle supported in two pillow blocks under the motor. The end of the spindle was drilled for an end mill with the same dimension on its diameter as the width of the groove in the leadscrews.

The pulley on the spindle was smaller than that on the motor to increase the cutter speed over the rpm of the motor. Two collars on the spindle took thrust, and a setscrew held the cutter in the spindle.

The desired pitch was set up on the lathe gearbox and leadscrew as if the thread were being cut with a single-point tool, except that everything was slowed down. The end mill was driven in to full depth so that only one pass was required to finish the job—and this made slowness necessary. However, this fact was an advantage because



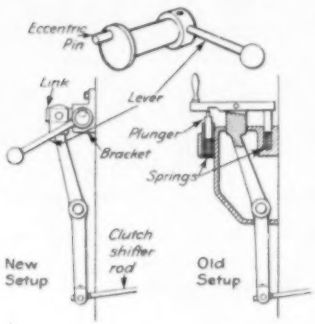
the machine could be left unattended for long periods and only checked on once in a while—and to pull out old work and insert new leadscrew blanks.

In fact, the job required so little attention that we rigged up a push-button and bell on the ways that would indicate to a worker that was busy on another job when the carriage was approaching the end of the cut. *Frank Biechele, Brooklyn, N. Y.*

Eccentric Mechanism Replaces Indirect Clutch Control

A NEW table and work-arbor control, added to an old hob grinder that is used for grinding cutters, can be applied in other spots on machine tools where easier motion and a simple mechanism is required. The control engages the clutch that drives the table and arbors past the wheel, and replaces an older type that needed a sharp, heavy pull to operate it.

A bracket was drilled to ¾ in. and mounted on the front of the machine base. This carries a pin that was cut from larger stock so a ½-in. throw could be machined on one end. The eccentric connects to a link which operates a bell crank that moves the clutch lever.



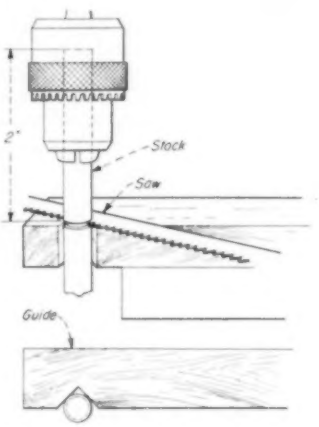
If the lever on the other end of the pin is pushed down, the eccentric is positioned so the clutch is disengaged, but when moved up it lets the clutch engage. The mechanism was made from scrap parts to replace the former stop-catch and plunger assembly. *Leo Keller, Allis-Chalmers Mfg. Co.*

Drillpress and Hacksaw Cut Off Lengths of Rod

ONCE when I was repairing some production machines in a small shop, I had to have a number of cold-rolled-steel pins, 2x½ in. No cutoff machine was available at the time, so I had to make the pins by means of a makeshift method.

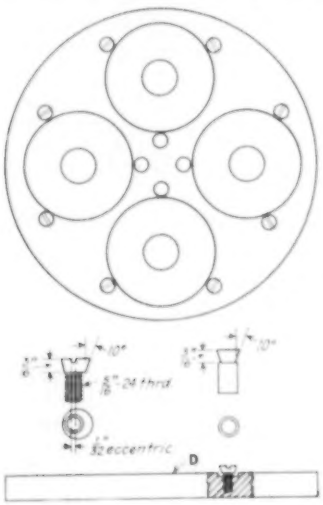
A bench drillpress was available, so I V-notched a piece of wood for a guide, and chucked lengths of ½-in. rod. A hand hacksaw was employed for notching the work as it rotated slowly, guided by the wooden piece. As the work still rotated, I took off burrs with a file, then removed the rod and snapped off the 2-in. piece with my hands.

The process produced parts of uniform length, with square ends, with a saving in time and effort. *David C. Williams, Needham Heights, Mass.*



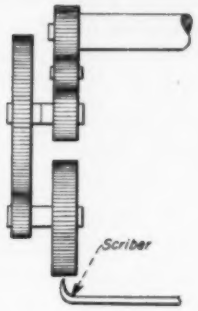
Side-Pressure Fixture Clamps Washers on Grinder Table

BRONZE WASHERS in a large quantity had to be ground to a 0.1875-in. thickness, and only two tenths were to be allowed as a tolerance, plus and minus. Because they were brass, they would not hold by themselves on a magnetic table.



The rotary-table surface grinder was employed, though, by holding the washers down four at a time. To do this, a ¾-in. plate fixture was ground flat and parallel, and was drilled and tapped for four sets of holding screws and dowels. For each washer, one dowel was cut to a wedge profile, as illustrated. These were pressed into the inner holes in the fixture, and remained there permanently.

Two screws for each washer were turned down to a cone shape that was eccentric, so the center of the cone was 1/32 in. off center. Each cone side was at an angle of about 10°. The screws were inserted on tapped holes in the fixture in positions so that when turned away from the washers, each washer could be lifted out and replaced. When the screws were turned back they exerted side pressure that held the washers in place and prevented jumping under the wheel. *Fred H. Lingenfelder, Milwaukee, Wis.*



Lathe Gear Train Substitutes For Dividing Head

INDEX WORK that can be handled in a lathe chuck or faceplate can be divided off without a conventional dividing head if the gear train in the headstock is utilized. A scriber can be mounted next to one of the gears where it can stop each tooth, or alternate teeth, in turn.

The right gear to be employed can be found by dividing the total number of driving-gear teeth by the number of driven-gear teeth. This number must be a multiple of the number of divisions required on the work, so gears can be substituted in the train to make the quotient come out right.

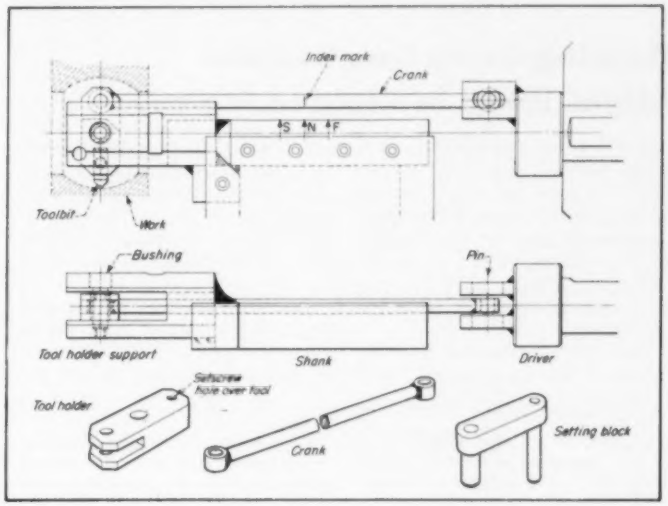
High accuracy can be obtained with this system, especially if the quotient is a large multiple of the number of divisions. In this case, of course, the train is indexed so the multiple number of teeth are passed by the scriber each time the work is indexed. *Federico Strasser, Santiago de Chile.*

Electrical Conduit Forms Strong Gage Members

LONG GAGES that are used manually can be reduced in weight by utilizing standard electrical conduit.

The conduit which is light, yet rigid, is slotted at each end. Two gaging members are welded or brazed into the slots. Hardened and ground wear strips which constitute the actual gaging surfaces are bolted directly to the gaging members. *Roger Isetts, Kenosha, Wis.*

THREADED HOLES that carried oil piping inside a spindle housing had to be tapped, but space was extremely limited. By brazing a piece of steel to the end of the tap and grinding a square for the wrench on the other end of the steel shank, we were able to insert the tap from the inside of the housing. *A. D. Rayment, Beloit, Wis.*



Power-Driven Cutter Machines Out Sockets

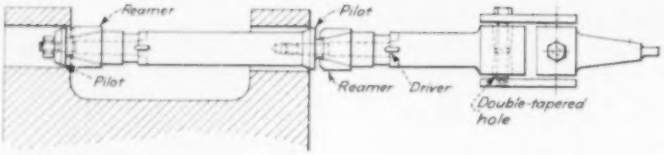
INTERNAL SPHERES are cut with a tool on a turret lathe that eliminates hand feeding and close observations. The tool, designed for light finishing cuts, gives high accuracy.

The tool body is built up from welded bar stock, and supports a rotating toolholder that is fitted with a round toolbit ground to a cutting edge. The yoke frame of the body carries a hardened steel bushing around which the toolholder pivots, and which also acts as a spacer to prevent the yoke from spreading or buckling.

At the back end of the body, the bar stock is cut to fit either in a cross-slide turret or on the saddle. A driver in the regular hex turret of the lathe is connected to the toolholder by a long crank and two dowel pins. The dowel bearing at the toolholder is round and a fairly snug fit, but the dowel at the driver is held in a slot.

Three marks, S, N, and F, on the shank of the tool show in relation to an index mark in the driver crank and indicate the position of the tool in the bore of the part. Starting a cut is done with the index mark opposite S, which will collapse the tool and bring the crank and toolbit close together in the yoke. This allows clearance to enter the hole. A cut is then made with the turret backing up until the index mark comes opposite the F mark—for finish.

For setup purposes with the tool withdrawn from the work the index mark is brought opposite the N mark—for neutral. In this position it is easier to measure from the pivot bushing to the tip of the toolbit. Best results are found with a setting gage as illustrated. One pin fits in the hollow pivot bushing, and the other acts as a feeler gage on the bit for one radius. *H. G. Frommer, Milwaukee, Wis.*

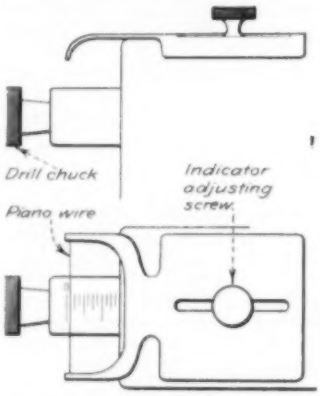


Floating-Drive Line Reamer Aligns Holes in Welded Frame

LARGE WELDED machine parts are tough to bore, especially if two holes that have to be in alignment are far apart. But pre-drilled holes are often thrown out of alignment by the welding. Many times the best way to align these holes is with a line reamer, such as the one illustrated.

The drive from the machine spindle is through a tapered shank and a universal joint (made with a simple yoke and bolts) to a drive shank. Two inserted-blade reamers are driven by the shank and are connected by a long driveshaft, and both are guided by short pilot sleeves.

Reaming with this arrangement means that the drilled holes will be followed, and will be aligned. *H. G. Frommer, Milwaukee, Wis.*



Tailstock Indicator Checks Depth of Drill in Parts

WE HAD a number of similar parts to drill to different depths, so we chucked them in a collet in a lathe. The drill was mounted in a chuck in the tailstock.

Although the tailstock spindle was marked off with fair accuracy, there was no good way to check these marks against anything to determine the depth to which the drill had been run. What we did was make a small indicator from sheet metal.

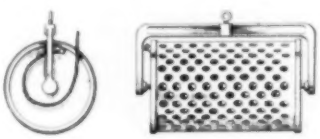
The indicator was curved to fit the top of the tailstock housing and extend a piano-wire line, between the arms of a yoke, over and close to the tailstock spindle. A longitudinal slot on the indicator allowed adjusting it and clamping it down by means of a screw into the housing.

For this job the accuracy was good enough, and the indicator was good for other jobs, too. *R. A. Lachmann, Chicago, Ill.*

Wrapped Chain Rotates Cleaning Cylinder

A PERFORATED CYLINDER is employed in our shop for cleaning small cup-shaped parts. It is supported by a chain hoist, and is lowered into a degreasing tank.

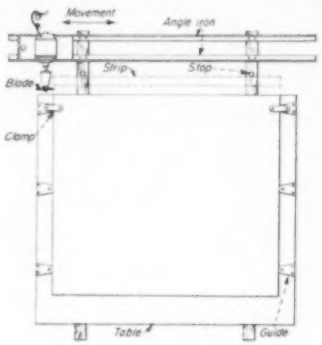
After the cleaning cycle, the cylinder is raised above the tank and is rotated by pulling the chain that is hooked to one end. This forces the solution to drain out of cavities in the cups. *Joseph E. Kramer, Ft. Wayne, Ind.*



Shop-Devised Rotary Saw Strip-Cuts Sheet Metal

A TEMPORARY shortage of aluminum strip made it necessary to cut up available sheets that were 4 x 8-ft in size. No large shear was on hand, and the strips had to be cut 2½ in. wide with no warp or twist. We handled the problem by making up a cutting machine with a small motor and an improvised carriage.

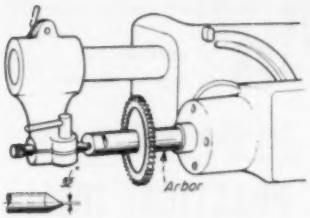
Two 7-ft lengths of 1½-in. angle iron were fixed to two pieces of timber that acted as a machine base. The iron was screwed down to form a channel about 6 in. wide, and the motor was mounted on a steel plate of the same width so



it could be slid along the channel.

A large steel sheet served as a flat table, and on this several narrow straps were screwed to guide the sheet parallel as it was fed in against two pin stops in the timbers. These were located so the motor, which was moved by a broom handle attached to a hinge bolted to the motor plate, would cut the strips off to the 2½-in. width.

Light clamps were added to one guide strap on each side of the table so the sheet could be easily locked after each time it was fed in to the pin stops. Heavier metal than the aluminum might require that the motor be weighted, as it was arranged to climb cut. Strips produced had clean edges, and were almost free of burrs. *Dan Penway, Carlisle, England.*



Eccentric Center on Miller Shifts Easily for Alignment

THE DEAD CENTER on the swing support of an old milling machine was not registering with the center hole on the free end of the cutting arbor. This misalignment was less than a 32nd, but it had to be determined accurately before the swing support could be shifted to line the center up again.

This was made a simple job by regrinding the center eccentrically, so the point was exactly off the geometric axis of the center by 1/32 in. Then the cutter arbor was locked in its horizontal location by swiveling the arbor against its stop. Finally the center was put back in the support, the support was loosened so it could be adjusted, and the center was left slightly loose so it, too, could be rotated.

Final adjustment to line up the end of the center was easy because both it and its swing support could be shifted around. When the center was perfectly in line, both it and the support were locked. *S. Framurz, Bombay, India.*

Drivers Chucked To Operate Drills

THE SMALL three-jaw chuck on my six-inch engine lathe will line up drills, but will not drive them. I designed and made small drill drivers from drilled disks.

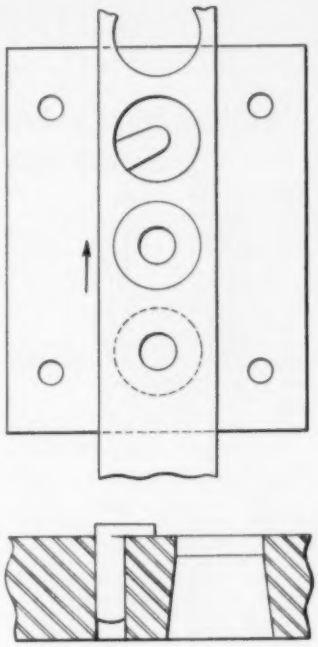
The cast-iron drivers are made for drill sizes from ¼ in. up to ⅝ in. A socket-head setscrew in each driver clamps on the drill and three rods brazed to the outside diameters of the drivers are driven by the three chuck jaws. The drivers can also be used for driving steel stock in the machine. *Lewis W. Spaulding, Warrenton, Ore.*

Wedging Stock Stop Forces Strip Against Left Guide

STRIP LOCATION in progressive dies is all-important. To make a strip-stock press job line up accurately each time the press stroked, I devised a form of stop gage that registered in blanked-out round holes in the scrap strip.

The first punch pierced a hole, and the second blanked out the washer-type part. At the third position I installed a round pin with a segment of a circle formed above the lower die. This segment caught each hole as the stock advanced, and because of the wedging action of the segment, which was neither parallel to the stock nor perpendicular to it, located the stock precisely. The wedge action forced the stock against the left-hand stock guide, which was located in relation to the punches.

Any play between the stock and the two guides was automatically thrown to the right. *Federico Strasser, Santiago de Chile.*

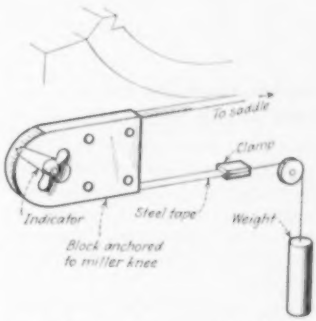


Rough Miller-Table Feed Gage Made with Flexible Tape

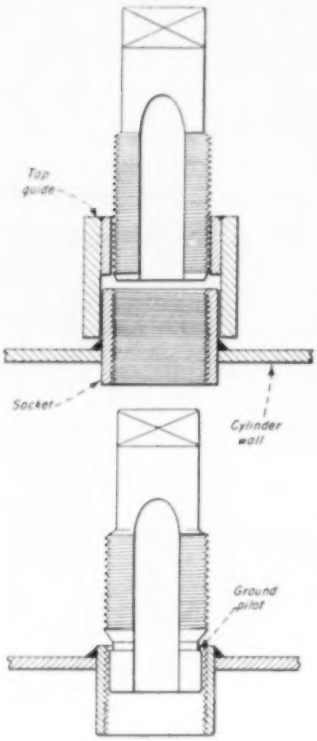
BY UTILIZING a broken steel tape from a flexible pocket rule, a cross-feed gage mechanism for a Bridgeport milling machine was made to supplement the dials.

An aluminum block was milled out with a dado on the top and bottom to track the tape, which was fed over a radius at the front. The block was bolted to the knee of the machine. An indicator was bolted to the block at the center of the front radius, and was bent over the radius to point to the tape.

The low end of the tape was fastened to the under side of the machine saddle, then the tape was looped around the radius and was brought back and attached to a 1/16-in. wire cable that operated over a sheave on the knee. The end of the wire was fitted with a lead weight. The location of the block was such that the tape would ride parallel with the saddle gibs, and so the block would extend about ½ in. in front of the machine knee.



After adjustments so the counterweight would be free at both ends of the table travel, the tape was ready for use. Travel readings were taken directly from the tape at the indicator. In many cases, the indicator was moved to a round number, provided it was still on the rounded part of the block, to simplify calculating mentally the reading that should come up as the table was moved as given distance. *Alphonse P. Berube, Salem, Mass.*



Guides Align Tap for Rethreading Sockets

CYLINDERS were recently produced in our shop—each having a 30-gallon capacity. The cylinders had tapped sockets in their ends and sides, but after galvanizing, we found that the sockets had to be retapped.

The zinc from the galvanizing process had become embedded in the threads, so normal hand-tapping was difficult. We solved the problem by making a tap guide. Two sleeves of steel were welded together; the inside sleeve slid over the tap, and the outside sleeve slid over the boss of each socket. With such a guide, the tapping was done easily.

Sockets which did not project from the cylinders far enough to allow use of the guide were refinished with a tap which had been ground off to the root diameter for the first ¾ in. on the end. This centered the tap and guided it in each socket. *W. Lewis, London, England.*

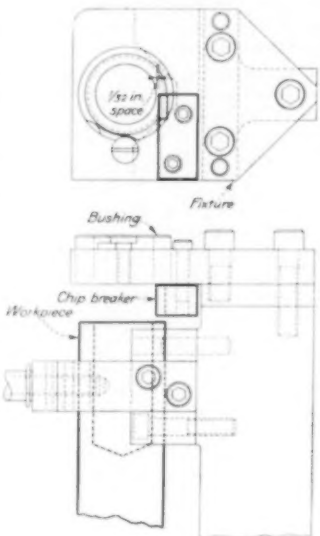
Carbide Chip Breaker Cuts Ribbons on Drilling Job

WE HAVE all heard much about chip breakers on carbide-tipped tools. This one, I think, is new: it is a chip breaker on a drill jig.

Chips would clog under the bushing plate when we drilled a 1 21/32-in. hole in one end of a bar-stock part. The part had already been drilled to a partial depth with a 11/16-in. drill, so centering was no problem. But the chips were. An operator had to clear out the jig by removing the part and sweeping two or three times for each part.

The long ribbon chips were broken up into pieces from ½ to 1 in. long by a carbide tool bolted to the underside of the bushing plate, with its corner on the centerline of the hole, and about 1/32 in. out from the hole circle.

Results were fine. The operator could now handle two machines instead of one, and costs were cut to a third. *Frederick G. Hauck, Louisville, Ky.*



$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER—Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

93rd Winner:

Bernard Levowich

Turning a Spiral

NEWS OF METALWORKING

European Machine Tool Output 20% Over Prewar

WASHINGTON—Western European machine tool production is now up 20% above prewar and delivery delays are cut to normal according to the Organization for European Economic Cooperation's second annual report.

Production of other machinery and metal products is also up to or above 1938 levels, including such things as textile machinery, electrical equipment, automobiles and commercial vehicles, and mining equipment. Most critical shortage still in existence, and one that hampers production in many dependent industries is sheet steel. But when the mammoth Western European steel mill expansion is completed in the next couple of years, sheet steel will be added to European export lists.

Metalworking Industries Will Suffer Least in Cut of ECA Aid Dollars

WASHINGTON—No matter how big a cut in third-year recovery funds results from the Congressional wrangling over ECA extension just now beginning, aid dollars for industrial equipment and raw materials will suffer the least.

That should be good news for the machine tool and metalworking industries, which are now enjoying the biggest year in ECA-procurement of their products that will probably occur in the whole four year recovery program. Despite cuts forecast, next year, fiscal 1950-51, should be almost as good.

This year, fiscal 1949-50, ECA financed procurement of machine tools is expected to hit $75 millions; for metalworking machinery — mostly rolling mill equipment — the figure will approximate $100 millions. According to present plans, ECA, next year, will finance $62 millions worth of European machine tool procurement, and around $80 millions of metalworking machinery buying, though part of this latter will be payments that fall due on equipment being ordered now.

Actually, expected increases in the loaning activities of the World Bank and Export-Import Bank plus a hoped-for step-up in private overseas investment may well counteract ECA-dollar cuts. This could keep your export business on as high a level as it is now.

Funds for German Recovery

ECA-aid dollars next year will include German recovery expenses formerly under GARIOA (Government Aid and Relief In Occupied Areas), in addition to the original ECA program. That's one of the things ECA inherited when the Defense Dept. turned occupation responsibilities over to civilians last fall.

ECA-Chief Paul Hoffman, until recently, planned to ask Congress for $3.1 billions to do this third-year job. However, after his latest unsuccessful trip to Paris where he tried to talk the Marshall Plan nations into further steps towards freeing trade and setting up limited convertability of European currencies, there is a good chance he'd settle for less.

Tough Fight for ECA

For ECA it's going to be a long tough fight on Capitol Hill, and Congress may end up appropriating a lot fewer dollars than ECA's estimated minimum needs. U.S. exports will suffer by whatever amount the cut is. But in any case the biggest procurement reductions will come in standard-of-living items, like food and consumer goods. Smallest reductions will come in industrial pipe line materials such as non-ferrous metals, certain basic chemicals and non-metallic minerals, and iron and steel, though in most lines, iron and steel production in Europe is or soon will be close to meeting essential needs. ECA countries have been exporting certain basic shapes to South America for over a year now.

Cuts in procurement plans for machine tools and metalworking machinery will be only slightly larger than those for industrial raw materials.

Handling Equipment, Portable Tools In U.S. Impress French Machinists

PARIS—French trade union representatives, members of a productivity team which has just completed a 5-week visit to the United States, reported that U.S. productive techniques could be used to advantage in France.

The French team, from the machine tool industry, studied methods used in the same industry in the United States under a technical assistance project sponsored by the French Government and the Economic Cooperation Administration.

The technical efficiency of U.S. plants attracted the attention of Jean-Marie Groslambert, 28-year old engineer.

"Excellent grouping of identical machines avoids waste motion in the flow of materials and reduces time and cost of maintenance by localizing the work of highly skilled repairmen. Material handling equipment—such as hoists, cranes, fork-lifts, and small power trucks—are used extensively in the U.S. In France, such equipment is not readily available and the space such equipment rekuires is extremely limited.

"Small power hand tools, electrical and compressed air, are more widespread in the U.S. and are close at hand for American workmen. The average age of machinery in the U.S. is low and one machine is used for one operation. In France, machinery is older and it is necessary for one machine to be used for several operations, causing greater consumption of time in re-tooling and changeover."

The comment of Louis Fahy, 37-year old foreman, dealt with productivity. Pointing out that some U.S. manufacturers produce several types of machinery, he said that "In France, the tendency has been for one firm to restrict output to one type in order to more quickly meet the demand which still exceeds production in the domestic market."

IF THIS ISSUE IS LATE

it may be due to disruption of mail schedules by the railroads' cancellation of trains caused by the coal strike. We regret this delay, which is beyond the editors' control.

Industrial Shorts . . .

ANNAPOLIS, Md.—Loads on journal bearings equal to two freight cars of coal in weight can be exerted with use of a test machine designed and built for the Naval Enginering Experiment Station here. The machine uses the same kind of frictionless surface on its loading device as the 200-inch Hale telescope. Even under full load, a small coin will register on the balance arm of the torque measurement device.

MONROE, Mich. — Operations of Ford Motor Co. at Hamilton, Ohio will be transferred to the recently acquired Ford plant here starting at once and continuing until September. All except newer employees will be offered jobs at Monroe. The move was made by the Parts and Equipment Mfg. Div. because of increases in production planned by the company on wheels, coil springs and running boards. Hamilton facilities were said to be inadequate for the enlarged output.

MIDLAND, Mich. — Dow Chemical Co. machinists have received an award from the company for working at their trade for 1,000,000 accident-free man-hours. For two and a half years, 207 machinists lost no time because of injury or accident in the company machine shops. That's 650 consecutive working days.

WASHINGTON — Production of Singer sewing machines in France is expected to increase substantially as the result of an industrial investment guaranty signed with the Singer Mfg. Co. of New York, which will lend $600,000 to La Compagnie Singer, an affiliated French company, for the purchases of machinery, equipment, and special tooling. The French company plans to make in France all parts required for this type of machine. It will buy locally all the equipment it can, but it will have to import from the U.S. about $1 million worth of specialized Singer machine tools and tooling.

SCHENECTADY—Hot enough to cut holes in firebrick and to melt tungsten, an "electronic torch" has been developed by scientists of General Electric Co.'s Research Laboratory. Heart of the torch is an electron tube known as a "magnetron," which produces radio waves with the frequency of one billion cycles per second. Leading from the tube is an antenna made of two short metal cylinders, one within the other. A high-frequency arc can be made to form on the end of the antenna. If certain gases, among them nitrogen and carbon dioxide, are fed past the arc, the electronic torch results.

Reduction in U. S. Tariffs Asked As Essential for European Recovery

WASHINGTON—Further U. S. tariff reduction is one of the things stressed in the OEEC's (Organization for European Economic Cooperation) second annual report as essential if full European recovery is to be achieved. Europeans would rather close the so-called dollar gap by selling more in the U. S., than by buying less. As dollar aid diminishes and finally ends, they've got to do one or the other.

As a matter of fact, there is some chance the Europeans may get their wish. Another round of tariff reduction negotiations under the reciprocal trade agreements act is due for next September. Under the principle of talking specific tariff cuts only with those nations which are traditional major suppliers, to date whole lines of machinery and equipment, scientific instruments, precision tools, and mechanical toys have been excluded from postwar tariff talks because Germany and Japan have not been included in negotiations. Prewar they were major suppliers in these lines.

The talks now scheduled for next fall will include Germany but not Japan. This is the result of a western Europe-U.S. compromise. U.S. wanted both the former Axis countries in on the negotiations. Europeans, anxious to keep all potential markets to themselves, didn't want to see either one get any trading breaks with the U.S.

However, with Germany included, negotiations will aim at trading for reductions in tariffs on those engineering products of which Germany was a major prewar supplier. The exact list of products won't be made public until sometime in April, but it should include certain lines of machinery and equipment, precision instruments and tools, and mechanical toys.

New Depreciation Policy Dead Issue

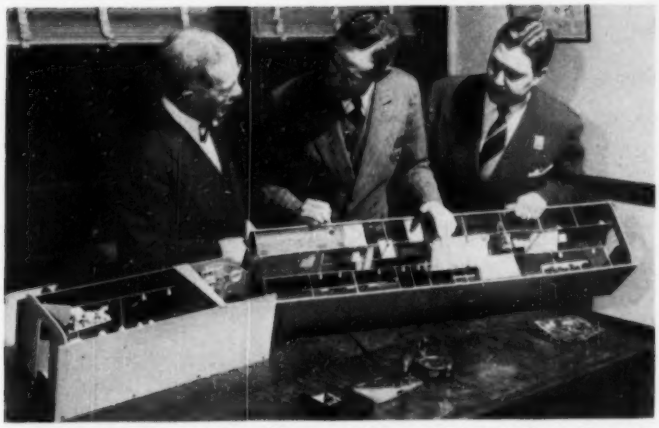
WASHINGTON — In the sheaf of tax suggestions Secretary Snyder offered Congress early this month, one proposal was conspicuous by its absence: Mr. Snyder said nothing about accelerating depreciation.

Last year the word from Washington was "wait until 1950." The score of bills to liberalize amortization allowances were supposed to get consideration.

But the bills now seem destined to gather dust in Ways and Means Committee pigeon holes. The reason is that there are simply too many other proposals with higher priority and in a year of high deficit, measures that cost revenue don't stand a chance.

$147 Millions in Metalworking Machinery Exports, Jan.-Sept. 1949

	Net Quantity	Value (dollars)
METALWORKING MACHINERY		**147,199,280**
Power-driven metalworking machine tools (nonportable)		
Engine, bench type and light duty type lathes	4,389	6,164,264
Turret lathes	242	2,660,447
Automatic chucking and between-center lathes	256	2,566,978
Other lathes	—	1,937,804
Boring mills and machines	344	3,275,230
Tapping, threading and automatic screw machines	1,657	5,779,053
Milling machines	1,170	5,794,424
Gear cutting machines	368	3,485,419
Drilling machines	3,537	2,640,639
Planers	146	1,042,698
Shapers, exc. gear shapers	342	738,409
Surface grinding machines	454	1,831,664
External cylindrical grinding machines, except universal	209	2,206,857
Internal grinding machines	157	1,479,200
Tool, cutter and external cylindrical universal grinding machines	2,027	2,844,236
Other metal-grinding machines	8,990	2,915,112
Other metalworking machine tools	3,071	5,543,287
Parts of machine tools	—	3,500,643
Accessories, equipment for power-driven machine tools		10,618,406
Power-driven metalworking machines, and parts (Total)		**73,361,950**
Sheets and plate metal-working machinery, parts		17,085,303
Forging machinery, parts		5,203,750
Rolling - mill machinery, and parts		41,636,054
Molding machines and cleaning and tumbling machines for castings		1,279,183
Foundry equipment, parts		3,479,581
Other power-driven metal-working machinery, parts		4,678,079
Other metalworking machinery (Total)		**6,812,560**
Pneumatic portable tools	21,269	2,157,965
Other portable and hand or foot-operated metal-working machines, parts		4,654,595
Electrical machinery and apparatus		**356,271,868**
Engines, turbines, parts		**147,689,572**
Construction, Excavating & Conveying machinery		**173,288,315**
Mining, Well and Pumping machinery		**148,157,430**
Textile, Sewing and Shoe machinery		**122,445,415**
Other industrial machinery		**283,304,145**
Agricultural machinery and implements		**105,996,926**



***SCALE MODEL** of one of the exhibit cars of General Electric's "More Power to America Special" is being inspected here by, (left to right) C. H. Lang, vice president in charge of sales, Apparatus Dept.; C. P. Fisher, Jr., manager, Apparatus Exhibit Train Div.; and J. S. Smith, manager, Apparatus Dept. Advertising & Sales Promotion Divisions. More than 2000 electrical products will be shown as . . .*

GE Promotes Apparatus Sales With 9-Car 'Showcase on Wheels'

SCHENECTADY—The "More Power to America Special," claimed to be the first train of its kind in industrial history, will be dispatched on a nationwide tour this spring by General Electric's Apparatus Dept.

Exhibits of electrical products, processes and techniques ranging from precise aircraft instruments to complex working models of steel mill, textile and other industry equipment, will be displayed throughout nine cars of the train.

The train will visit the country's key industrial centers for inspection by utility and industrial executives and municipal leaders. It will not be open to the general public.

Pointing out that the exhibits will dramatize the latest apparatus and ideas for producing and using electric power most efficiently, C. H. Lang, vice president in charge of sales for the Apparatus Dept., said that "'The More Power to America Special' represents one of our greatest efforts to meet current selling conditions in highly competitive markets, and we look upon it as the most important single promotional undertaking in General Electric's industrial marketing history."

Included in the exhibits will be turbines of all types—steam, gas and mercury; equipment for transmitting and distributing electric power, and motors and controls engineered into combinations that can perform a wide variety of industrial operations.

The train will be hauled by an Alco-GE two unit, 4000-hp diesel-electric locomotive which itself will be part of the unusual series of displays. The cars are being built by Pullman Standard Car Mfg. Co.

Export Aid for Small Firms

WASHINGTON—Machine tool and metalworking firms having trouble capturing export orders in ECA Europe will be interested in a directory of European "Importers of ECA Financed Commodities" just out.

Compiled by ECA's Office of Small Business, the directory lists in three volumes European importing firms alphabetically within major commodity groupings according to what they buy. Vol. III lists buyers of machinery and vehicles. The volumes can be obtained free of charge by writing the Office of Small Business, Economic Cooperation Administration, 800 Connecticut Ave., N. W., Washington 25, D. C.

New AIEE Officers Named

NEW YORK—Titus G. LeClair, assistant chief electrical engineer, Commonwealth Edison Co., Chicago, was nominated to succeed James F. Fairman of New York as president of the American Institute of Electrical Engineers at the winter general meeting here Jan. 31-Feb. 3.

Nominated for vice presidents were: J. G. Tarboux, Cornell Univ.; C. S. Purnell, Westinghouse Electric Corp.; J. R. North, Commonwealth Services, Inc., Jackson, Mich.; H. R. Fritz, Southwestern Bell Telephone Co., St. Louis; J. A. McDonald, General Electric Co., Salt Lake City.

McGraw-Hill

WORLD NEWS Notes

AMSTERDAM — Netherlands Railways have obtained a license from American Westinghouse to build locomotives here. Actual construction will be done by Werkspoor of Amsterdam and Heemaf of Hengelo. The first batch of 25 will remain in Holland. Subsequent units might be exported. This is the first time that locomotives will have been built in Holland.

SAO PAULO, BRAZIL — The local Federation of Industries reports that Brazilian manufacturers are turning out 7000 electric motors monthly, of various sizes, and asserts that this is adequate for the whole Brazilian market, except in types not made in Brazil.

PARIS — November production figures show a slackening off in the French mechanical industry, especially in machine tools. Production of items such as nuts, bolts, chains, and hardware is generally holding its own. Output of medium and heavy mechanical equipment is approximately 115% above the prewar level. But in this line competition from the Saar is making itself felt. Metal goods from this region are selling as much as 10% lower than similar French products in some instances.

RIO DE JANEIRO — A Brazilian railway-car manufacturing concern, the Fabrica Nacional de Vagões, has delivered six steel passenger coaches to the Braganca Railway, the first of their type to be made in Brazil. All of the material was of Brazilian manufacture except for bearings and axles. The firm claims it can produce 100 passenger cars and 3000 freight cars annually.

JOHANNESBURG — A South African engineering firm, Dorman Long (Africa) Ltd. has started exporting railway freight cars to neighboring territories. The firm is supplying 720 steel bogies to Rhodesia and has orders for about 600 for the Portuguese East African railways. The S. A. Railways has taken delivery of 6000 freight cars from the company and ordered another 4000. The only items not made in the Union are wheels and draw bar equipment.

LONDON — Sizeable orders have been placed by the Egyptian government for both the de Havilland Vampire and the Gloster Meteor, which are the two standard jet-powered fighters of the RAF. Deliveries will be made by air over the next 12 months. The first two Meteors have already been flown out to Cairo.

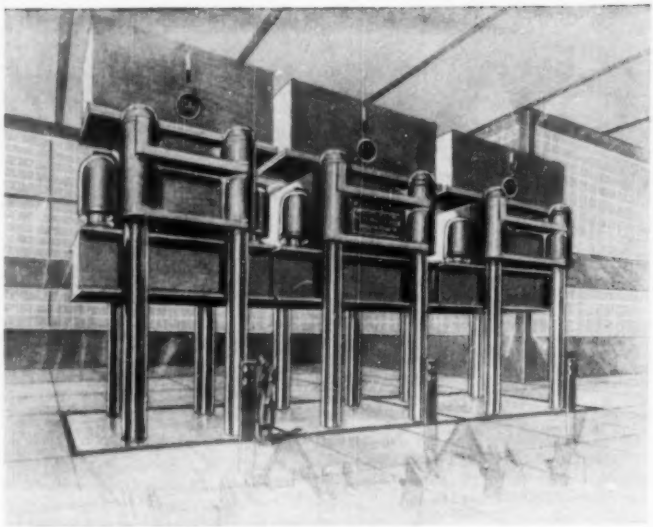
Big Machine Tools Build Giant Press

MT. GILEAD, Ohio—To make big presses big machines are needed. So when National Tube Co., Pittsburgh, required a giant hydraulic press of 18,000 tons capacity to enlarge its steel-pipe-making facilities, the contract was placed with Hydraulic Press Mfg. Co., whose Mt. Gilead plants are modernly equipped with the necessary huge machine tools, some of which are shown on this page.

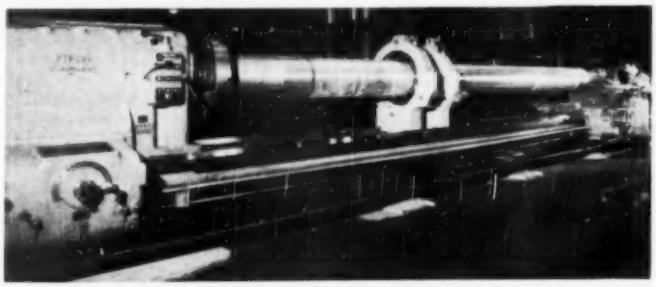
The giant press, depicted in the drawing to the right, is actually a combination of three 6000-ton press units, built in line. The press when completed will weigh over one million lb, and 5100 gal of oil will be required for operation. It will be a self-contained unit equipped with hydraulic pumps and electric motor drive. The pumps, of a radial piston type, are also designed and built by HPM. The die mounting surfaces of the press measure 54 by 492 in.

Here's how the pipe is made: Steel plate up to 113 in. wide, 40 ft long and ½ in. thick is first placed in a 2000-ton press which forms it into a U shape. Plate is then transferred to the 18,000 ton HPM press which forms the U shape around a mandrel to the required diameter. The formed sections are then conveyed from the press to an automatic seam welder. The forming operation in the press requires 47 seconds per piece, exclusive of material handling time. All forming work is done cold.

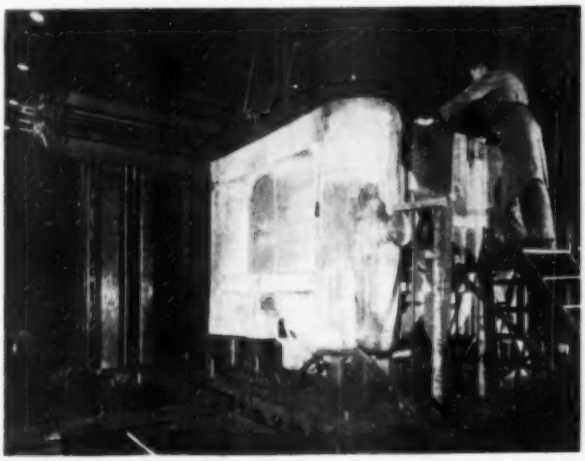
Consolidated Western Steel Co. is now completing final plans for a similar pipe plant in Orange, Texas.



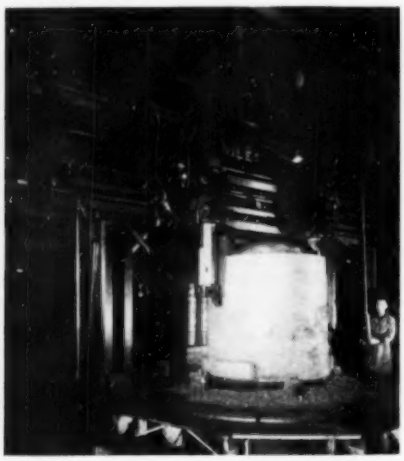
18,000 TON HPM PRESS, *made from three 6000 ton press units built in line*



STRAIN RODS, *which are steel forgings, are 17 in. dia, 297½ in. long, weigh 19,000 lb. Journal diameter must be machined to tolerance of .001 in.*



CYLINDER, *one of three each weighing 93,500 lb. Four to five in. stock left on by foundry must be planed off bottom prior to machining cylinder bore on this Cincinnati Hypro-Planer*



NILES *vertical mill machines one of three rams to dia of 65 in. with .005 in. tolerance. Machining time: 115 hr per ram*

Labor Notes . . .

WASHINGTON—Chances of the International Association of Machinists returning to the AFL are good. The AFL executive council has voted to discuss settlement terms with the IAM over the opposition of William Hutcheson, who threatened to pull his carpenters out of the AFL if the machinists are given jurisdiction over millwrights. In that event, labor observers see a possible affiliation between Mr. Hutcheson and John L. Lewis.

WORKING CONDITIONS and management practices in our machine shops are being studied by a group of 14 Norwegian technicians, supervisors and workers under the auspices of the Marshall Plan technical assistance program. A major objective of the visit is to help solve Norway's man-power shortage by raising the production and efficiency of workers.

MACHINE TOOL business should be increased as a means of developing a sufficient number of skilled craftsmen to be available in case of a sudden national emergency. This can be done by government encouragement of liberal machine tool replacement policies in industry and by increasing standby and experimental orders. This was the answer IAM President Albert J. Hayes gave at an Armed Forces Industrial College seminar when asked if the union discouraged the entrance of apprentices into the industry by restricting membership or by other means. He denied any restrictions. At the same time, he admitted that the union tries to enforce a ratio of not more than one apprentice to every ten journeymen.

Container for H-Bomb Is Metalworking Problem

WASHINGTON — President Truman's decision to go ahead with production of the hydrogen fusion bomb poses at least one problem for the U. S. metalworking industry, that of coming up with a bomb container strong enough to insure maximum effectiveness.

One reason today's atom fission bombs are so much more effective than those that ended World War II is that in modern A-bombs a much greater share of the charge actually explodes. Before, the bulk of the uranium was thrown clear and remained intact, thus contributing nothing to the reaction.

To an even greater degree you have the same problem in the proposed H-bomb. The longer the container holds together—measured in billionths of a second—the more effective the bomb will be.

When is Machine Economically Dead? MAPI Gives Replacement Formula

WASHINGTON. A new guide to determine when a machine is economically dead and due for replacement was advanced today by the Machinery and Allied Products Institute after more than three years of research by George Terborgh, Institute research director, and a group of equipment manufacturers.

A "replacement formula" is presented, with practical instructions for its applications in an industrial company, in a 75-page "MAPI Replacement Manual," published by the Institute. The formula measures the imperfection of performance of the machine in use in relation to the best alternative available.

"While technology and managerial techniques in most fields have made tremendous progress, the technique of determining when to replace equipment is as unscientific in most cases in 1950 as it was a hundred years ago", said William J. Kelly, president of the Institute. "The 'hunch' and 'rule of thumb' which guide most equipment replacement are nothing but specimens of industrial folklore handed down from one generation of managers to another."

Mr. Kelly presented two basic requirements of a good replacement policy:

1. A reliable technique for determining when equipment is economically replaceable, including, as an essential element, a measure of the cost of deferring replacement.

2. An organizational setup to insure that management, including top management, is apprised promptly and fully of developing re-equipment opportunities.

"No live industry can keep abreast of technology without continuous renewal and transformation of its productive facilities. Existing equipment must be kept on the defensive, compelled always to justify its tenure against the challenge of currently available alternatives. If it fails to meet this challenge, it must be displaced regardless of its age or condition, regardless, therefore, of whether it is physically worn out.

The Manual is intended as a guide to top management in determining sound replacement policy and to the specialist in analyzing the factors on which replacement decisions should be based.

Engineers Must Find Peacetime Uses for War-Born Developments

MILWAUKEE — Engineers and designers have not completed work on applying to peacetime uses knowledge of raw materials and processes generated by war developments, according to Joseph B. Armitage, vice president, Kearney & Trecker Corp., who addressed the opening session of the one-day national meeting held here Feb. 8 by the Machine Design Div. of American Society of Mechanical Engineers.

In reviewing wartime developments of importance today, Mr. Armitage referred specifically to postwar improvements in gas turbines, plastics, electronic instruments, precision casting methods, synthetic rubbers, and others. A great number of new metal alloys have been discovered, he said, but many of these alloys have not been put to a use. This does not mean that they will not prove of much value in the future.

Nearly 500 members and guests attended this ASME meeting, which was sponsored by the Milwaukee section of the Society. The morning was given over to an inspection of Nordberg Mfg. Co.'s huge Milwaukee plant. Visitors inspected the new Nordberg 1800 hp, 400 rpm, two-cycle radial diesel engine, two 4250 hp, 140 rpm marine diesel engines, and toured Nordberg's modern shops and laboratories.

Afternoon and evening sessions were given over to panel discussions of the influence of customer demands and suggestions on the design and performance of capital goods, including machine tools, heavy construction machinery, etc.

Disagree on Standards

Floor discussion during the afternoon sessions brought out the widely different requirements of various types of machine tool users, and emphasized the difficulty of getting even members of the same industry to agree on design standards suited to their needs.

It was pointed out, for example, that different divisions of one of the largest automobile companies place different interpretations on the JIC (Joint Industry Conference) standards to which the machine tool industry has been asked to work. And, as a result, a machine acceptable to one division will not be acceptable to another. Furthermore, one large organization in the auto industry does not accept the JIC standards, but has a different set of standards for its own use.

Detroit

CHRYSLER STRIKE DIMS HOPE OF RECORD IN FIRST QUARTER
NEW TOOLING POSSIBLE AT CONTINENTAL . . . K-F SHOWS NEW LINE

The strike at Chrysler Corp. threw a pall over hopes of the auto industry for a record-setting first quarter. Even so, output will be amazingly high for the initial period of the year. With Chrysler tied up, car and truck production at all points was still running in excess of 125,000 units a week—king-sized figures indeed for the "slack" winter season.

The reason for that kind of volume, of course, lies in the sales outlook. Virtually all car makers are hearing good news from their sales outlets and expect to continue to get those kind of reports. Field stocks are building up during the winter period, but not at a rate which might be expected in the light of heavy factory shipments.

The Chrysler strike shows signs of being one of those battles of principles which could continue interminably before a settlement. The strike is the more confusing because the union—after having plumped for pensions and health insurance and nothing more since last August—veered about and said just before zero hour that it would take a straight wage raise instead with part, maybe all, of the 10¢ demands.

The likely reason for this shift was to translate demands into a kind of platform which would be a better springboard for a strike, from the worker viewpoint, than the comparatively vague, in-the-future issue of pensions.

Beginning of Pension Drive?

Nevertheless, there were some observers who felt that this switch in demands might portend the beginning of the end of the pension drive by the big unions. The reason for a reduction of pressure would be the moves of congress to increase federal old age benefits and thus cut away a large share of the "gains" made in past pension settlements.

As proof these people noted that the United Auto Workers, at the very moment it was striking Chrysler, was holding off on pension demands by other locals. The positions of most locals in pressing pensions on the companies they deal with have been lackadaisical.

And UAW has made pension-less settlements, too. One such was the closely guarded pact between an auto union local, approved by the international union, and Carter Carburetor Co., St. Louis. This major parts producer arrived at an agreement which freezes out pensions from future discussions for 2½ years, and freezes insurance talks for 4½ years. In return the company improved its existing insurance plan considerably and paid for more holidays—no more. Wages, too, are frozen for a year from now.

Does this mean a shift in basic strategy? Maybe not yet. But it portends, quite likely, a future turn. By the time UAW gets into sessions with General Motors, in the spring, you can expect to find wage demands on about an equal footing with the pension position the union will take.

So much for labor. The big production news from Detroit in the past fortnight has been the establishment of a 6-day week in most manufacturing operations at Ford, aimed at building more than 8,000 units of all types daily by Apr. 1, including 5,000 Ford cars. Now that Taft-Hartley action is in process to halt coal mine tieups, the outlook is for sustained manufacturing at the Rouge and elsewhere.

Behind the scenes there is news that Continental Motors Corp. is dickering right now with Ordnance for producion of a smaller-size air-cooled engine of the sort it contracted to build more than a year ago. The indication: new tooling needed.

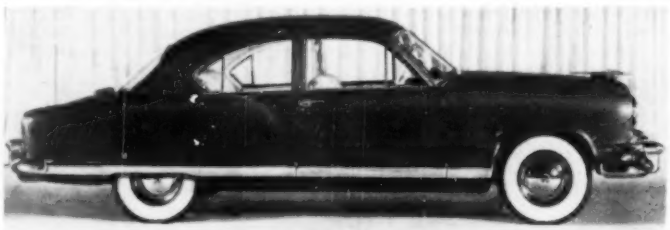
Pricewise the car and truck makers are getting closer toward prewar relationships which were upset during the initial lush days of postwar. Studebaker cut prices from $82 to $135 late in January on its current models, saying high production was making amortization possible faster than had been anticipated. Hudson had a price cut on its way to dealers at the selfsame time; reductions of $87.50 to $166.50 were made on the 1950 Super and Custom Commodore lines announced during February.

One big splash of the month, however, was reserved for Kaiser-Frazer. That company announced three lines of automobiles for 1950, including a lower-priced series to appear in June. And, in the view of those who saw them, they were deserving of Hollywood superlatives.

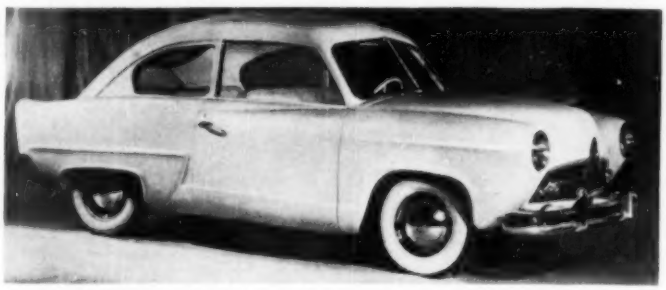
4- or 6-Cylinder Engine

In addition to completely revamped Kaiser and Frazer lines, the company is showing another 2-door sedan intended to compete in the "low, low priced" field. This job, full-size, will be available in standard and deluxe models with a choice of a 4- or 6-cylinder engine produced by Willys-Overland. Gasoline mileage upward of 30 miles per gallon is promised.

The "hot" car of the three may be the middle-priced Kaiser. It is restyled in lines reminiscent of the Studebaker, low and rakish. As with the Frazer series, a 115-hp engine does the driving, and the GM Hydra-Matic transmisison is optional. The two senior lines have been expanded to include both two-door and four-door models, as well as the special jobs previously announced in 1949 versions—a hard-top convertible, and the "vagabond" unit for station wagon and sedan use.



THE KAISER, smoothly restyled to compete in 1950's middle-priced market.



K-F NEWCOMMER is this 2-door sedan for the "low, low priced" field

Names in the News

John H. Baninger

John H. Baninger, assistant chief engineer, New Departure Div., General Motors Corp., Bristol, Conn., has retired. He joined New Departure in 1926 and was assistant chief engineer since that date. Previously he was chief engineer at Marlin-Rockwell Corp., Jamestown, N. Y., 1914-1926. He was head of the axle, transmission and frame section of the engineering dept. at Willys-Overland Co., Toledo, 1910-14.

Leroy A. Critchfield has joined Standard-Thomson Corp., Dayton, Ohio, as director of the chemical and metallurgical laboratory. Since 1944 he has been head of the Dayton office of United Chromium Inc.

Tom Handley has been named sales manager for Vic Pastushin Industries, Inc., Los Angeles. Previously he was with Douglas Aircraft Co., Inc. and Saval, Inc. **Carl W. Luthey** and **Joseph H. Moore** have been named factory manager and plant supt., respectively.

William J. Powers has been named manager of the clad and conversion sales dept., Lukens Steel Co., Coatesville, Pa. He has been acting manager.

Donald M. Berges has been named chief engineer, Pesco Products Div., Borg-Warner Corp., Bedford, Ohio.

C. W. Fuller has been transferred to the staff of the manager of manufacturing, Large Apparatus Div., Apparatus Dept., General Electric Co., Schenectady. **N. E. Firestone** has been named staff assistant to the manager of manufacturing. Other appointments: **K. O. Schulte,** manager of wage rate; **W. H. Bobear,** manager of purchasing; **T. F. Garahan,** production manager; **K. N. Bush,** assistant production manager; **A. V. Feigenbaum,** supervisor of training, manufacturing personnel.

Gustavus J. Esselen has been elected vice president, United States Testing Co., Inc., Hoboken, N. J. He will continue in active direction of the Esselen Research Div., recently created by merger of Esselen Research Corp. with the United States Testing Co.

Robert C. Stockton has been named general traffic manager, Stewart-Warner Corp., Chicago, succeeding the late **E. F. Stecher.**

George L. Carr has been named assistant to the sales manager, Colonial Broach Co., Detroit. He was vice president and sales manager of Apex Broach Co., and previously was in sales engineering work for Arrow Tool & Reamer Co.

C. J. Marlett

C. J. Marlett, Chicago district representative for Kennametal Inc., Latrobe, Pa., has been transferred to the engineering dept. at Latrobe. As project engineer he will be engaged in research and development on new applications of Kennametal.

John C. Ewer

John C. Ewer, abrasive engineer in the Boston District for Norton Co., Worcester, Mass., has been named assistant general manager of Norton Grinding Wheel Co., Ltd., Welwyn Garden City, Herts, England. **Raymond J. Forkey,** abrasive engineer in Rochester, N. Y., will succeed Mr. Ewer at Boston. Other changes: **William C. Howard,** formerly field engineer in the Hartford, Conn., area has been named abrasive engineer in New Haven, replacing **J. Lawrence Tobey,** resigned. **John W. Wheeler** has been named field engineer, replacing Mr. Howard at Hartford. **John W. McCue** and **F. Donald Wing** have been named field engineers in the Chicago office.

Carl F. Norberg has been elected executive vice president of Electric Storage Battery Co., Philadelphia. He was formerly vice president in charge of manufacturing since 1944.

J. F. Lacchia has been named sales engineer in the Michigan territory for Cleveland Punch & Shear Works Co., Cleveland. He was with **E. W. Bliss Co.** for 26 years, serving in such capacities as assistant supt. of machine shop, manager works sales engineering, and sales engineer.

Obituaries

Robert C. Todd, 68, former vice president of Armco Steel Corp., died Jan. 19. He was district manager of Armco sales in Detroit from 1917 to 1923, became assistant vice president in 1931 and vice president in 1946. He became consultant to Armco three years ago.

Major Albert B. Cudebec, 72, vice president of Hydropress, Inc., New York, died Jan. 28. In 1937 he joined Loewy Engineering Co., Ltd., England, who named him representative and trustee in the U.S. In 1940 he became vice president of Hydropress. He was active in development of ordnance equipment during World War II. In World War I he had been

Major Albert B. Cudebec

a member of General Pershing's staff and an officer of the French Legion of Honor.

Creed W. Fulton

Creed W. Fulton has been elected vice president and manager, New York office, of Trundle Engineering Co., Cleveland. He was formerly vice president of Samuel J. Creswell Iron Works, Philadelphia. **Harry L. Wood,** vice president, will head the Trundle Chicago office.

Leo S. Ohman has been elected to the newly created position of vice president in charge of manufacturing, Hannifin Corp., Chicago. He joined Hannifin in 1948 as factory manager after serving as chief industrial engineer for Brown Instrument Co., Philadelphia, and later for Chefford Master Mfg. Co., Inc., Fairfield, Ill. Previously, he had been associated with Minneapolis-Honeywell Regulator Co., as specialist in factory material handling and production process control.

Whitney E. McDowell has joined the sales staff of Barney I. Florey Co., Cleveland representative for Automatic Transportation Co., Chicago.

W. R. Caple has been named coordinator of branch office activities for the magnesium sales dept. of Dow Chemical Co., Midland, Mich.

J. Robert Bunch has been named sales representative to assist **J. D. Alexander** in the Cleveland sales office of American Wheelabrator & Equipment Corp., Mishawaka, Ind.

Myron S. Curtis has been named assistant to the president, Youngstown Sheet & Tube Co., Youngstown, Ohio, succeeding **Roy M. Welch,** who retired after 48 years with the company. Also retired, after 43 years with Youngstown, is **Walter E. Scott,** manager of flat rolled sales.

Herbert G. Kieswetter has been named assistant general manager, Mechanical Goods Div., United States Rubber Co., New York. He was formerly vice president and assistant general manager of United States Rubber Export Co., Ltd.

Leonard Kebler, chairman, Ward Leonard Electric Co., Mt. Vernon, N. Y., was reelected a board member of the National Industrial Conference Board for a term of one year. **Arthur A. Berard,** president and general manager of Ward Leonard, was elected a board member of National Electrical Manufacturers Assn. for a three year term.

Business Items

E. W. Bliss Co., Toledo, has appointed five new sales representatives: Stedfast & Roulston, Inc., Boston, covering Maine, New Hampshire, Vermont, Rhode Island and the eastern sections of Connecticut and Massachusetts; Lakeshore Machinery & Supply Co., Muskegon, Mich., covering western Michigan; Wm. S. Bolden Co., Inc., Charleston, W. Va., covering West Virginia; Corry's Machine & Tool, Inc., Davenport, Iowa, covering Iowa and part of Illinois; Ellfeldt Machinery & Supply Co., Kansas City, covering eastern Kansas and western Missouri.

Union Twist Drill Co., Athol, Mass., has appointed Machinists Tools Inc., Buffalo, N. Y., as distributor in Buffalo and surrounding territory.

Rivett Lathe & Grinder, Inc., Boston, has purchased the entire line of Gerotor air and hydraulic valves, cylinders and hydraulic power units from Gerotor May Corp., Baltimore. All manufacturing and selling operations of the line are being transferred to Boston. Gerotor May Corp. is retaining the manufacture and sale of Gerotor hydraulic pumps and fluid motors. The Gerotor trade name will identify the new Rivett line, which will be marketed through the Gerotor dealer organization.

Titanium Metals Corp. of America, has been formed by National Lead Co. and Allegheny Ludlum Steel Corp., to market and distribute titanium metal, its alloys and various related products. The new company will make its headquarters in New York.

Ready Tool Co., Bridgeport, Conn., has recently acquired all the patent, manufacturing, and sales rights of the Barter-Ritco reversible grinder dog, formerly manufactured by the Rhode Island Tool Co., Providence. Machinery and equipment for manufacture of this grinder dog will be transferred to the Ready plant in Bridgeport, with sales being handled by the Ready sales organization.

Kelly Reamer Co., Cleveland, has appointed Superior Detroit Co. exclusive sales and engineering representatives for Michigan.

Bay State Abrasive Products Co., Westboro, Mass., will spend $200,000 for new machinery, equipment, and buildings. Among other equipment a new 800 ton hydraulic press designed for the hot pressing of different types of organic bonded wheels has already been ordered.

Edward Blake Co., West Newton, Mass., has established a tap servicing dept., offering a precision tap sharpening service.

Metalwash Machinery Corp., Irvington, N. J., has opened a new plant on U.S. Route 1 at North Avenue in Elizabeth, N. J. The manufacturing area of more than 30,000 sq ft is served by traveling cranes with capacities up to 35 tons, as well as railroad sidings.

Williams & Hussey Machine Co., purchaser in 1949 of the O.K. Tool Co., Shelton, Conn., has moved offices and manufacturing from Shelton to Wilton, N. H. O.K. Tool will retain its identity and operate as a division of Williams & Hussey. In addition to the modern equipment already available at Wilton, nearly $200,000 will be invested in new machinery.

Brown & Sharpe Mfg. Co., Providence, R. I., has opened a Los Angeles office at 3040 East Olympic Blvd.

Meetings

Feb. 20-21—American Materials Handling Society, conference; Purdue University, Lafayette, Ind.

Feb. 27-Mar. 3—American Society for Testing Materials, spring meeting; Hotel William Penn, Pittsburgh.

Feb. 28-Mar. 1—Chamber of Commerce of the United States, national marketing conference; Hotel Book-Cadillac, Detroit.

Mar. 14-16—Society of Automotive Engineers, passenger car, body, and production meeting; Hotel Book-Cadillac, Detroit.

Mar. 28-31—Society of the Plastics Industry, national plastics exposition; Navy Pier, Chicago.

Apr. 10-12—American Society of Lubrication Engineers, annual convention; Hotel Statler, Detroit.

Apr. 10-14—American Society of Tool Engineers, industrial cost-cutting exposition; Philadelphia Convention Hall.

Apr. 12-14—American Society of Mechanical Engineers, spring meeting; Hotel Statler, Washington, D.C.

Apr. 17-19—Society of Automotive Engineers, aeronautic meeting and aircraft engineering display, Hotel Statler, New York.

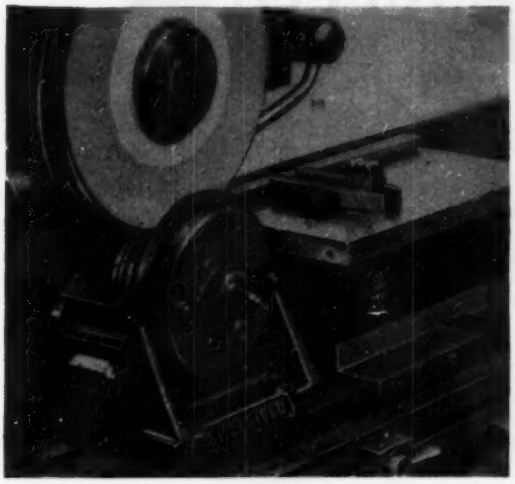
Apr. 24—Packaging Machinery Manufacturers Institute, semiannual meeting; Hotel Sherston, Chicago.

Apr. 24-27—American Management Association, national packaging exposition; Navy Pier, Chicago.

Apr. 25-26—Metal Powder Association, annual metal powder show; Book-Cadillac Hotel, Detroit.

Apr. 25-26—Machine Tool Electrification Forum, sponsored by Westinghouse Electric Corp.; Hotel Statler, Buffalo.

Cut Grinding Time up to 75%



and Reduce the Cost

of Dressing Tools at the Same Time

If you are producing threaded or formed parts, flat or cylindrical, you can make significant savings in both time and over-all costs by the use of Sheffield Crushtrue Devices on commercial surface and cylindrical grinders.

A Crushtrue Roll forms the face of the grinding wheel accurately regardless of how intricate the form may be. Work parts are then ground with this wheel in much less time than is possible by any other method of wheel forming.

Sheffield maintains a stock of Crushtrue Rolls for immediate delivery on all standard U. S. threads from 8 to 32 pitch. When your Std. U. S. Thread Rolls need regrinding, ship them to Sheffield and reground rolls from Sheffield's "Bank" will be shipped to you within 24 hours. You don't have to wait for your original rolls to be reground.

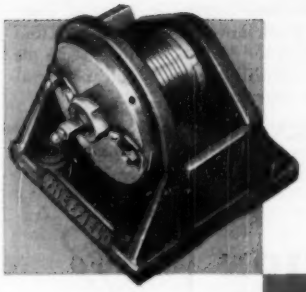
As long as you continue returning your Sheffield standard thread Crushtrue Rolls for regrinding, you will get immediate replacements on an economical cost basis. You will never have to buy new rolls.

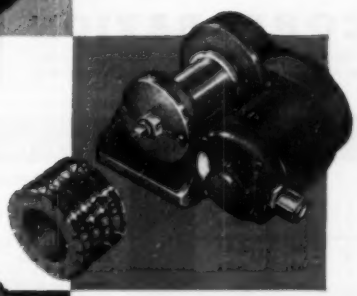
The Sheffield "Bank" plan reduces your costs and down time if you manufacture threaded production parts, thread rolling dies or 60° serrated tools. Sheffield Crushtrue Rolls are the answer to greater economy and more productivity.

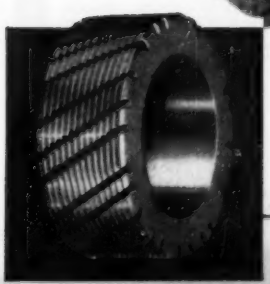
Crushtrue Rolls for special threads and forms can be supplied economically and promptly.

Write for information or for a personal conference.

5439







the *Sheffield* corporation

Dayton 1, Ohio, U.S.A.

SHEFFIELD

See what "FM" stainless can give your products

High sales appeal and lasting customer satisfaction are among the many advantages of Armco Stainless Steel bars and wire in your products.

Resistance to heat and corrosion "pay off" with your customers; free-machining properties of the chromium-nickel and the chromium grades help you produce machined parts profitably.

You can machine Armco 18-8 FM, Type 303, and Armco 12 FM, Type 416, at speeds ranging between 75% and 85% of those used for Bessemer screw stock.

Chemical and mechanical properties of the two grades differ (see table).

If your product-problem is corrosion or strength, consider the advantages of these solid rustless steels that *never need plating* or *replating*. Then let's talk it over. We're sure you'll find one of the Armco Stainless grades the most satisfactory, most saleable metal for your products.*

*Other Free Machining grades of Armco Stainless Steel include Armco 17FM (Type 430F), Armco 13-C-35FM (Type 420F) and Armco 17-C-100 FM (Type 440F).

ARMCO STEEL CORPORATION

3340 Curtis Street, Middletown, Ohio • Plants and Sales Offices from Coast to Coast • The Armco International Corporation, World-Wide

ARMCO

TABLE 1

CHEMICAL ANALYSIS

Type	Carbon (Max.)	Manganese (Max.)	Chromium	Nickel	Molyb. or Zirconium (Max.)	P, S or SE (Min.)
303	0.15	2.00	17.0-19.0	8.0-10.0	0.60	0.07
416	0.15	1.25	12.0-14.0		0.60	0.07

TYPICAL MECHANICAL PROPERTIES

Type	Size and Condition	Ultimate Tensile Strength, psi.	Yield Strength 0.2% Offset psi.	Elonga. in 2", %	Hardness	
					Brin.	Rock.
303	1" Annealed and Cold Drawn	100,000	60,000	40	212	B95
416	1" Tempered and Cold Drawn	100,000	85,000	13	205	B94

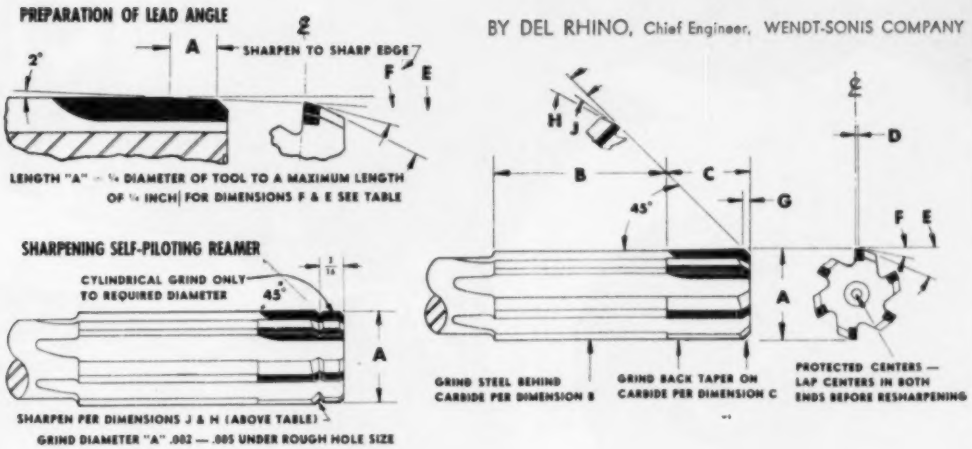
TABLE 2

CUTTING RATES

AISI Types Based on These Brinell Ranges	303 150-240	416 180-240
SURFACE FEET PER MINUTE		
Automatic Screw Machine	100-130	120-150
Heavy Duty Spindles	90-120	110-130
Turret Lathe	90-120	100-130
Milling	40-60	50-80
Threading	10-25	10-25
Tapping	10-25	10-25
Drill Press	50-80	60-90
Single Point Turning Carbide Tooling		
Roughing	150-250	150-200
Finishing	200-400	200-400
High Cobalt or Cast Alloy		
Roughing	100-150	100-150
Finishing	150-200	150-200
Tungsten or Moly. High-Speed Alloy		
Roughing	70-90	80-100
Finishing	100-140	100-150

Sharpening Carbide-Tipped Reamers

BY DEL RHINO, Chief Engineer, WENDT-SONIS COMPANY



HOW TO REDUCE REAMER SIZE

To reduce the diameter of a carbide reamer by 0.0002 or 0.0003 in., it is necessary to use a lap as follows:

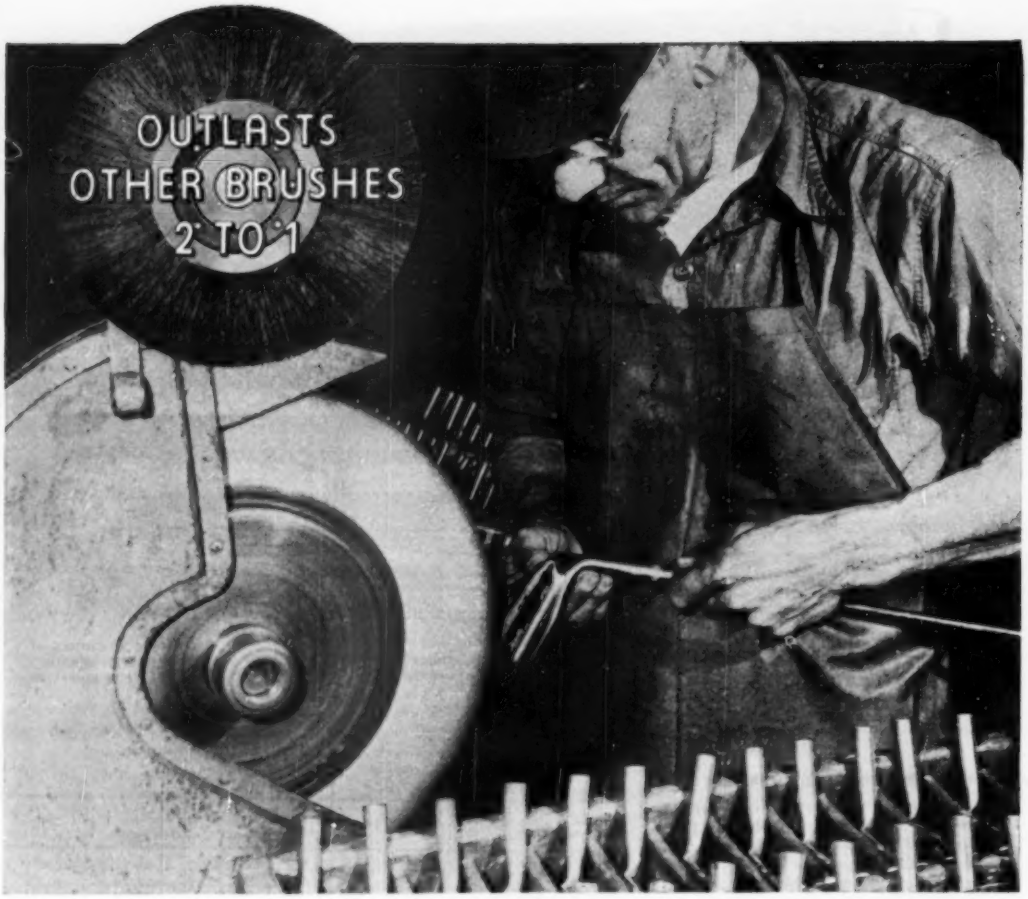
1. Drill and ream a hole in a piece of cast iron or mild steel slightly longer than the carbide insert.
2. Apply 180- or 240-grit diamond dust in light oil paste solution to the cylindrical land of the carbide inserts only. Spread solution just thickly enough to cover the land. Insert reamer in cast-iron block and revolve counterclockwise (providing, of course, that tool is right-hand cut) for ten to twelve complete revolutions.
3. Remove reamer, wipe two opposite flutes and check for size. Repeat this operation, adding diamond dust paste only when necessary.
4. Do not try to remove more than 0.0003 or 0.0004 in. from reamer diameter unless it exceeds 1 in. Then you can safely remove 0.0006 to 0.0008 in.

HOW TO ELIMINATE CHATTER

1. Increase the feed per revolution.
2. Reduce rpm.
3. Use close-fitting bushing 0.0002 to 0.0003 in. larger than reamer diameter.
4. Grind the secondary lead angle of approximately 2° on carbide immediately back of the 45° chamfer.
5. Use power feed whenever possible.

A	B		C		D	E	F	G	H	J
Reamer Diameter	Back Taper	Length	Back Taper	Length	Circular Land	Angle On Steel	Angle On Carbide	Length Of Chamfer	Angle On Steel	Angle On Carbide
.250	.0005	1	.0002	1/2	.005	27°	7°	1/32	27°	11°
.2812	.0005	1	.0002	1/2	.005	27°	7°	1/32	25°	11°
.3125	.0005	1	.0002	1/2	.005	27°	7°	1/32	25°	11°
.3437	.0005	13/16	.0002	11/16	.005	27°	7°	1/32	25°	11°
.3750	.0005	13/16	.0002	11/16	.005	27°	7°	1/32	25°	11°
.4062	.0005	1-1/16	.0002	11/16	.010	25°	7°	1/32	25°	11°
.4375	.0005	1-1/16	.0002	11/16	.010	25°	7°	1/32	25°	11°
.4687	.0005	1-1/16	.0002	11/16	.010	25°	7°	1/32	19°	9°
.5000	.0005	1-5/16	.0002	11/16	.010	25°	7°	1/32	19°	9°
.5312	.0005	1-5/16	.0002	11/16	.010	22°	7°	1/32	19°	9°
.5625	.0005	1-5/16	.0002	11/16	.010	22°	7°	1/32	19°	9°
.5937	.0005	1-5/16	.0002	11/16	.010	22°	7°	1/32	19°	9°
.6250	.0005	1-9/16	.0002	11/16	.010	22°	7°	1/32	16°	8°
.6562	.0005	1-9/16	.0002	11/16	.010	22°	7°	1/32	16°	8°
.6875	.0005	1-9/16	.0002	11/16	.010	22°	7°	1/32	16°	8°
.7187	.0005	1-9/16	.0002	11/16	.010	22°	7°	3/64	16°	8°
.7500	.0005	1-13/16	.0003	11/16	.010	22°	7°	3/64	16°	8°
.7812	.0005	1-13/16	.0003	11/16	.015	22°	6°	3/64	16°	8°
.8125	.0005	1-13/16	.0003	11/16	.015	22°	6°	3/64	16°	8°
.8437	.0005	1-13/16	.0003	11/16	.015	22°	6°	3/64	16°	8°
.8750	.0005	1-15/16	.0003	11/16	.015	20°	7°	3/64	16°	8°
.9062	.0005	1-15/16	.0003	11/16	.015	20°	7°	3/64	16°	8°
.9375	.0005	1-15/16	.0003	11/16	.015	20°	7°	3/64	16°	8°
.9687	.0005	1-15/16	.0003	11/16	.015	19°	6°	1/16	16°	8°
1.0000	.001	2-1/16	.0003	11/16	.015	19°	6°	1/16	16°	8°
1.0625	.001	2-1/16	.0003	11/16	.020	19°	6°	1/16	16°	8°
1.1250	.001	2-1/16	.0003	7/8	.020	19°	6°	1/16	15°	6°
1.1875	.001	2-1/16	.0003	7/8	.020	19°	6°	1/16	15°	6°
1.250	.001	2-1/8	.0003	7/8	.020	17°	5°	1/16	15°	6°
1.3125	.001	2-1/8	.0003	7/8	.020	17°	5°	1/16	15°	6°
1.3750	.001	2-5/8	.0003	7/8	.020	17°	5°	5/32	15°	6°
1.4375	.001	2-5/8	.0003	7/8	.020	17°	5°	5/32	15°	6°
1.5000	.001	2-5/8	.0003	7/8	.020	17°	5°	5/32	15°	6°

*The above information applies only to the chucking reamers—excluding reamers with carbide full length of flute.



TAKES SLICE OUT OF FINISHING COSTS with *OSBORN BRUSHES*

● Whether brushing stainless steel to a lustrous satin-like finish or brushing carbon steel to refine its polish prior to plating, Osborn MONARCH® Power Driven Brushes perform the job easier, faster and at a lower cost. In the application pictured above, Osborn MONARCH® Brushes *outlast all others 2 to 1.* This longer brush life is the result of the Osborn Ringlock construction, which prevents shedding, assures balance and a full, even working face required in an efficient brushing tool.

For your finishing problems, whether removing scale or producing micro-smoothness on metal, plastics or any other materials, consult an experienced Osborn Sales Engineer. Write or call:

THE OSBORN MANUFACTURING COMPANY
Dept. 245, 5401 Hamilton Avenue Cleveland 14, Ohio

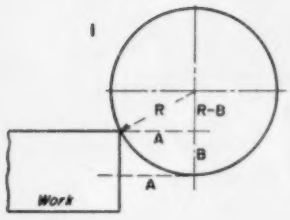
Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES

American Machinist REFERENCE BOOK SHEET

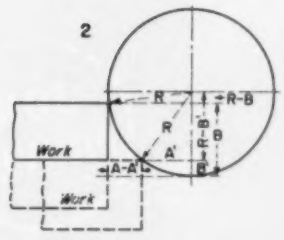
Approach Distance for Milling and Hobbing...I

BY V. G. HOTCHKISS, Industrial Engineer, DEERE & CO., MOLINE, ILL.



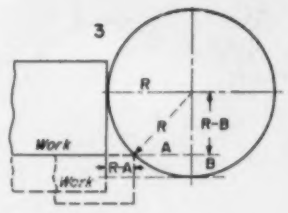
Condition 1

$R^2 = (R-B)^2 + A^2$
$A^2 = 2RB - B^2$
$A = \sqrt{B\,(D-B)}$
A = Approach
Where R = Cutter radius
D = Cutter diameter
B = Depth of cut



Condition 3

$R^2 = (R-B)^2 + A^2$
$A^2 = 2RB - B^2$
$A = \sqrt{B\,(D-B)}$
$R - A$ = Approach



Condition 2

$R^2 = (R-B)^2 + A^2$
$A^2 = 2RB-B^2$
$A = \sqrt{B\,(D-B)}$
$R^2 = (R-B')^2 + A'^2$
$A' = \sqrt{B'\,(D-B')}$
$A - A'$ = Approach

Approach of a milling cutter or hob may be defined as the distance traveled by the tool between first contact with the work and full engagement in the cut. This value is used when estimating the milling or hobbing time for an operation, according to the formula:

$$\text{Time} = A + L + O/f$$

where A = approach, L = length of cut, O = overtravel and f = feed in inches per minute.

Means for calculating the approach for three sets of conditions are provided by the nomograph on page 151. This chart saves the labor of solving the general formula:

$$A = \sqrt{B(D-B)}$$

where B = depth of cut and D = cutter diameter.

Condition 1 . . . Approach distance for slab milling, cutting keyways and slotting. In such operations the center of the cutter is above the top of the work. Use the chart thus:

Example: Cutter diameter, 4 in.; depth of cut, 0.400 in.

1. Subtract depth of cut, 0.400, from cutter diameter, 4, to get 3.60 as the value of *D-B*, first scale on chart.

2. Lay a straightedge on chart at the 3.60 value on *D-B* scale and 0.400 value on the depth of cut scale and read approach distance equals 1.20 in., approximately, on the center scale.

Condition 2 . . . Face milling, end milling and similar operations, when the top of the work is *below* the center of the cutter; and the bottom of the work is *above* the bottom of the cutter.

This case, and Condition 3, are basically the same as Condition 1, when visualized as two separate pieces of work extending below the cutter indefinitely. Here the bottom of the actual workpiece extended to the cutter becomes the top of a visualized workpiece. The difference in the approach distances of the two pieces is the actual approach distance for the situation in hand.

Example: Diameter of cutter, 10 in.; near edge of work, 3 in., from periphery of cutter (bottom point projected), distance B; far edge of work 1 in. from periphery of cutter (bottom point projected) distance B'.

1. Subtract 3 in. depth of cut from 10 in. cutter diameter, and find that value of $D-B = 7$ in.

2. Lay straightedge across 7 and 3 in. values on the two outer scales and read approach distance A equals 4.60 in., approximately.

3. Subtract 1 in. depth of cut from 10-in. cutter diameter and get 9 in.

4. Lay straightedge at 9 and 1 on the two outer scales and read approach distance $A' = 3$.

5. Actual approach distance $A\text{-}A' = 4.60 - 3 = 1.60$ in.

Condition 3 . . . Face milling, end milling and similar operations, when the top of the work is *above* the center of the cutter and the bottom of the work is *above* the bottom of the cutter. This situation is visualized as two pieces of work extending below the cutter as in Condition 1. The bottom of the actual workpiece extended to the cutter becomes the top of the visualized workpiece. The actual approach distance equals the difference between the approach distances for the two cases, and equals *R-A*.

Example: Cutter diameter, 4 in.; far edge of work 0.500 in. from periphery of cutter, bottom point projected, distance B.

1. For the visualized case, $D\text{-}B = 4 - 0.50 = 3.50$ in.

2. From the chart, with a straightedge connecting the values of *D-B* and *B*, the approach distance *A* for the visualized case is 1.32 in. approximately.

3. By inspection, the actual approach distance for the work equals $R\text{-}A = 2 - 1.32 = 0.68$ in., approximately.

CHASER LIFE INCREASED 50%

Sun Cutting Oil Improves Quality of Threads, Steps-up Pipe Nipple Production

Operation: Threading 4" pipe nipples

Machine: Landis Threading Machine

Material: 4" galvanized welded steel tubing SAE 1025-1040

Speed: Threading 1½" on each end of about 300 pieces per 8-hr. day

Chaser Life: 3 days before resharpening

Cutting Fluid: Sun Cutting Oil 31W

A manufacturer threading pipe nipples was not getting satisfactory finished threads with the cutting fluid in use. Chaser life was abnormally short, resulting in excessive downtime and high percentage of rejects, with consequent loss of production.

Changing to Sun Cutting Oil 31W, this shop increased chaser life 50 percent, and reports that "the threads are the best we ever made." With rejects practically eliminated and downtime for changing chasers reduced to the absolute minimum, production has greatly increased.

Sun Cutting Oil 31W is a dark, free-flowing, sulphurized oil. It is recommended for heavy duty jobs where an emulsified cutting oil is not suitable. For further information about Sun Cutting Oils or other "Job Proved" Products for the metalworking industry, call or write the nearest Sun Office. The services of a Sun Engineer are available without obligation.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

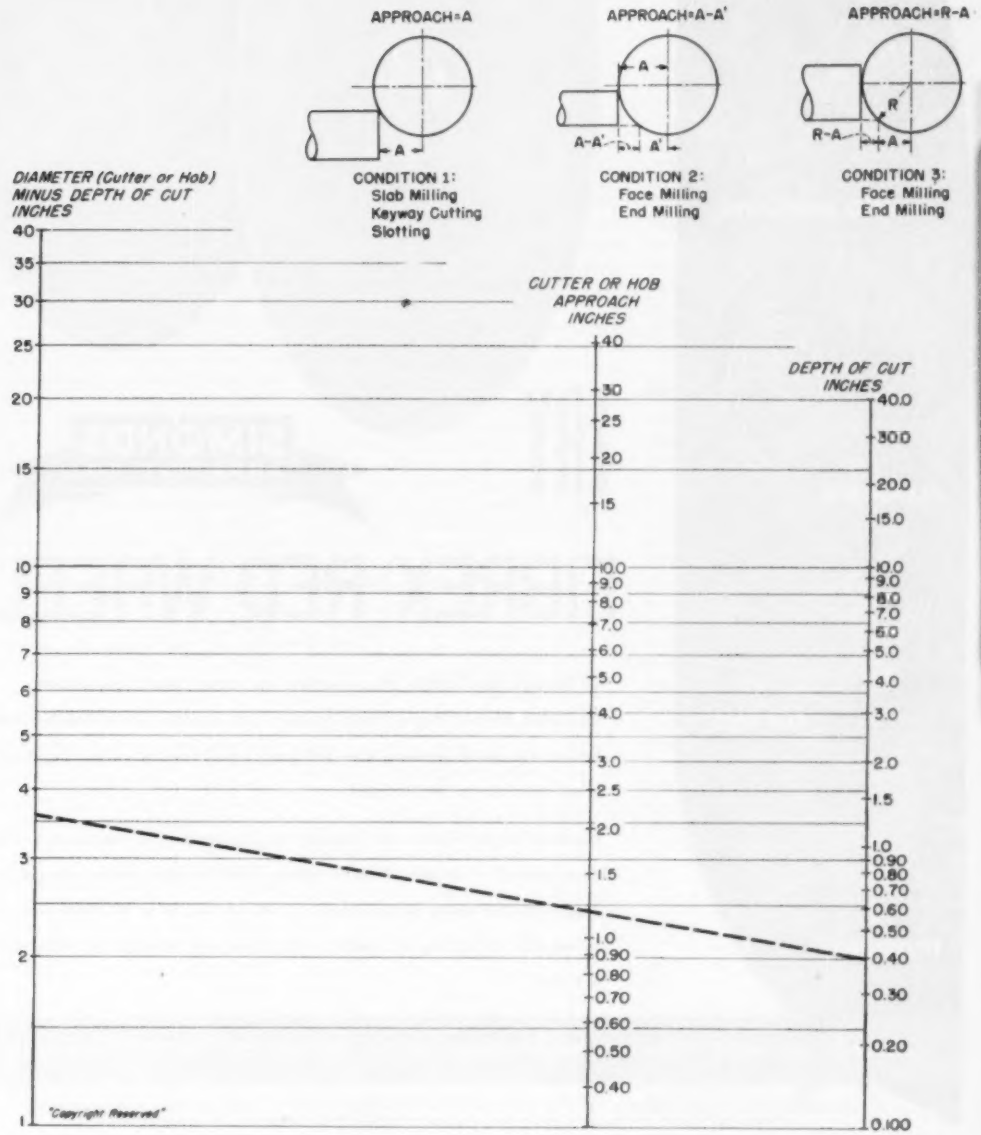
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

SUNOCO

"JOB PROVED" IN EVERY INDUSTRY

Approach Distance for Milling and Hobbing...II



NEW!

TRY SIMONDS ABRASIVE CO.

FIBREX® RED WHEELS

TRADE MARK

For EXTRA LONG WHEEL LIFE, versatility, fast cutting, here's your answer . . . Fibrex Red Wheels. They're strong, tough durable for truly outstanding action in heading into welds, removing flash and bead and cleaning up rough ragged surfaces, especially on stainless steel.

Depressed Center Wheels (with adaptor) for all portable disc sanders and right angle grinders . . . straight wheels for cutting and all purpose grinding with regular equipment. Your choice of grain sizes . . . 16, 24, 36, 50 or 80. Send now for Bulletin ESA 186 giving full details on these new and amazingly versatile abrasive tools.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N. Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE.

TALKING SHOP

Pigeons

IN AN OLD New England town, there's a tall machinery-making plant beside a burbling river. And over the town—part of the time—are many pigeons. Between flights, they fly into the plant buildings and waddle importantly among the workmen. They do help clean up lunch scraps, but it's hard to assemble a shaft weighted at one end by a pigeon. Management has tried to get rid of them by ordering the windows kept closed and by screening. But there is some suspicion that there's at least one pigeon fancier on the payroll—windows are opened and screen cut loose at the corners, mysteriously, of course. And corn and wheat—the first undistilled and the second unground—appear among the luncheon scraps. Poison or shotguns would cause quite a flurry among the tender-hearted. Anyone know a Pied Piper of Pigeons?

Industrialingo

SOME YEARS AGO, we coined the word "industrialingo" to describe the specialized vocabularies that characterize any industry. Latest additions to our collection were gotten on a recent down-East trip. Examples: "Jumper" for shaper, and "gagger" for bolt threader. Both threw Howard Rich, Jr., of Lynd-Farquhar, Boston, when he first heard them. "Fleeting the tool" describes the process of machining a surface longer than stroke of the head or machine. For example, if a long tool or arbor is gripped close for boring or shaping, the head fed to maximum feed, then the cut stopped while the head is retracted and the tool extended and regripped 'way out on the shank end, and the cut resumed, that's "fleeting".

And at Saco-Lowell Shops, one spinning frame of each order is completely assembled and tested with spindles, etc. Other frames are fitted together and checked, then dismantled and not actually completely assembled until all parts arrive at the user's mill. This process of selective testing is "dressing the frame."

Old Materials Still Good

SO MUCH ATTENTION is being paid these days to the development of new materials to obtain higher physical properties that engineers are prone to overlook the possibilities of using old familiar materials with new treatments. Low-carbon steel tubing, for example, can have its tensile strength increased 40% or more without heat treatment, or 100% or more with heat treatment, by cold reducing from larger sizes of hot-drawn tube. Process developed by Tube Reducing Corp. consists of passing the tube through a pair of rocking dies which can reduce cross-sectional area as much as 80% in one pass. Resultant work hardening is not a skin effect, but is effective through the entire metal thickness. Decarburization is reduced and machinability increased.

Gobbledegook

OUR BRITISH ASSOCIATE, "The Machinist", deplores in a recent editorial the trend toward compounded letters to form new special words, such as Fritalux, Benelux and Ukiscan for various economic unions. We've had a bit of that in the United States too, with our TVA, ECA and other alphabetical agencies, and more seems to be coming.

Our guess is that it all started with coined advertising words and slogans. Then the USSR began to shorten its resounding names for government combines. Germany picked up the fad in naming weapons. Anyway, any layman now has the opportunity to have a language all his own—which only he and his intimates can understand. In Metalworking (pardon us, "MW" or "Mewog"), we could say, "Brosasm 5 is set for a thoufpm, with feed of twothouiper." Then we could all quietly settle into a corner and read Jabberwocky.

Bur Plus Speed

EVER HEAR of the straw driven though a tree by a hurricane? A carbide bur, driven at 5000 fpm in a portable tool, will cut hardened tool steel to bits without evidence of wear on the bur.

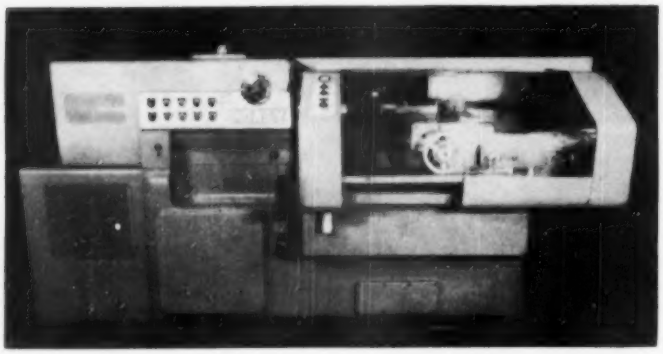
Costly Faking

FOR PROPER FINISH, longest tool life and greatest production, carbide-tool angles must be exactly maintained. Despite instructions to toolroom personnel to complete the regrinding of tools to specific angles, one shop superintendent found tools flaking and chipping in service. Careful checking found personnel had been regrinding the tools offhand—or at best had been unconsciously easing their work by "hudging" the cutting edge of the tool toward the wheel. This, of course, resulted in incorrect side rake and clearances.

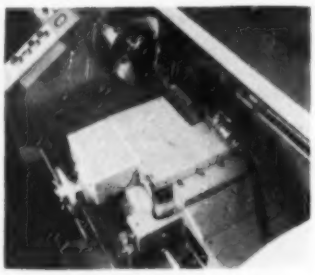
Chip Buckets

RICE BARTON CORP. has recently dug pits in the concrete floor near each major machine tool, and in the center of groups of smaller machine tools. In each pit is placed a plate-steel bucket with drop bottom which can be lifted out and dumped by a fork truck with special dump-hook attachment. The trap is closed by a steel grill through which metal chips will pass easily. About once an hour, a clean-up man passes by each machine and puts the chips into the hopper. As most production is on cast iron, the only chips which need to be carried away separately are the occasional ones of steel or bronze produced at only a limited group of machines. Between clean-up visits, the operator himself can readily dispose of chips if they get in his way.

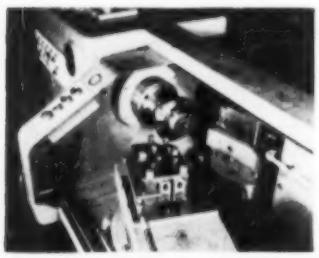
New Shop Equipment



Morey Automatic Lathe Incorporates Coolant Guard, Hydraulic Chucking



Chuck and compound slide with two feed movements is for boring and back facing operations on bevel-gear blank. Micrometer dial is provided for tool setting.



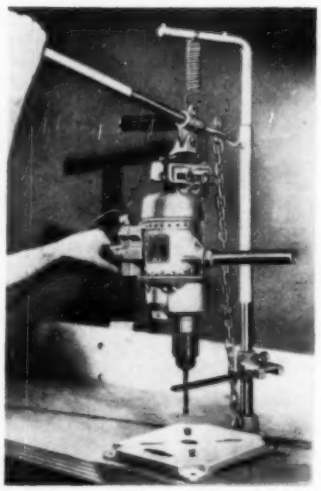
Special chucking device and two automatic toolslides mounted on a swivel base are for taper turning of two bevel gear faces

All moving parts on the New Model CD automatic lathe are completely inclosed by a Plexiglas coolant guard during the operating cycle. To insure operator safety and to cut production time, closing of the shield is included as part of the automatic cycle. The workpiece is manually loaded, hydraulically chucked, and the following 20-sec work cycle is started by pushing a button: The guard closes, spindle brake is released, clutch is engaged, spindle starts rotating, coolant flow begins, toolslides advance rapidly, change to feed, dwell at the end of cut for an adjustable time delay, and return to the starting position, clutch is released, brake is applied, the spindle stops, the coolant is shut off, the guard opens, and the machine is ready for unloading.

The basic machine consists of bed, headstock, and power unit, and a choice of three different toolslides is provided to suit specific requirements. Toolslides can be supplied with 4- or 8-in. feed stroke, or with two feed motions. They have individual control for feed stroke and feed rate with infinite variation and dial control. All tools are relieved on the return stroke, to increase tool life and avoid marking of the workpiece when tungsten-carbide tools are used.

The lathe is driven by 50-hp motor, but the headstock can transmit up to 75 hp. All hydraulic and electrical controls have been built to the new J.I.C. standards. A special chucking device facilitates chucking all workpieces in ring form without the use of a C washer, reducing manual effort and chucking time. All automatic toolslides are equipped with micrometer dials for quick, accurate setting. Manufacturers say the rigidity and accuracy of the machine makes possible turning of rough forgings to finish-turned size in one cut, maintaining tolerances as close as 0.001-in. in continuous production. Tungsten-carbide tools are used on this machine at cutting speeds up to 1000 fpm.

Morey Machinery Co., Inc., 410 Broome St., New York 13, N.Y.

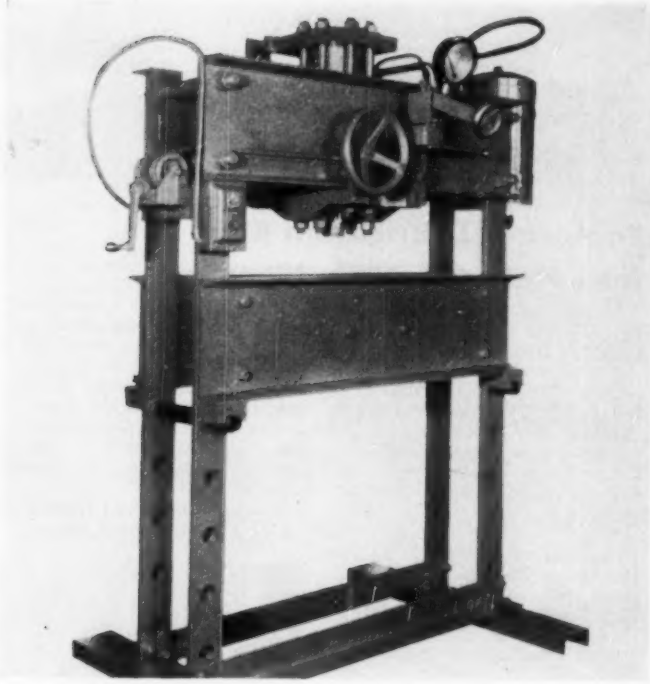


Portable Drillpress Designed For 3/8- to 1/2-in. Drills

Weighing 26 lb, this portable drillpress may be used, as shown, on shop workbench, or dismounted, to apply leverage in hard-to-reach spots. The drill is held in place by a special clamp and leverage is obtained by anchoring a steel chain and applying pressure on the lever arm. The assembly is designed for use with any 3/8-to 1/2-in. electric drills.

Sudenga Iron Works, George, Iowa.

Materials and Parts



Riveting, Straightening Press Provides Finger-Tip Control

Said to combine the advantages of both electric and hydraulic drives for riveting, straightening, and pressing, the Lempco Elect-Draulic 150-ton press is equipped with finger-tip control which quickly runs the ram down to the work and builds up pressure rapidly to a pre-selected tonnage. The ram kicks off at a predetermined setting, eliminating the danger of spoilage or mashing rivets. Hydraulic operation in both directions is said to provide powerful ram retraction, making stripping or the operation of pull broaches possible. Ram speed is 12 to 13 in. per min, with ram travel of 12 in.

Roller mounting facilitates moving the ram and cylinder unit across the entire width of the press. A 12-in. space between both bolster and side columns permits work to be fed from the side or front of the press. The bolster is raised or lowered by hand crank. The pump is a radial fixed-displacement unit and the press is powered by 10-hp motor. A safety valve eliminates overloading.

Lempco Products, Inc., Bedford, Ohio.

Low-Carbon Steel Resists Rigid Corrosion Tests

Key to the production of this corrosion-resistant steel is the reduction of carbon content to 0.03% max while maintaining the 18% chromium and 8% nickel of the usual "18-8" stainless steels. Test samples of the steel have been boiled in 65% nitric acid for 240 hours and in both copper sulphate and sulphuric acid for 500 hours with no evidence of corrosion. Tests were made after

...INCLUDING

Plain grinding machine has foolproof lubrication. Should the lube system fail, grinding-wheel drive automatically stops ...page 156

Speaker system records and automatically reproduces safety warnings at the danger point..page 157

Optical jig borer is equipped with a combination drilling spindle and microscope.....page 160

Ball-bearing pipe coupling handles fluids under high pressure and is capable of rotating a full 360°, up to 60 rpm.....page 162

Lithium-atmosphere forge furnace provides protection from scaling up to 2400 F..... ...page 164

Multiple-head pneumatic riveters consist of groups of standard heads, assembled to meet needs of special jobs.. .....page 166

NEW BULLETINS for your Shop Library include 47-page catalog covering machines for milling, broaching, cutter sharpening, grinding, lapping, and flame-hardening.....pages 233-234

...and in March 6

Single-spindle automatic bar machines, engineered for high flexibility and tooling simplicity, are available in sizes from 2⅝ to 5⅛ in.

Special contour miller simplifies the production of small intricately contoured parts. The unit is controlled by a master cam and handles work up to 5-in. dia.

Heavy-duty semi-production honing machine affords single-lever head control and hones bores from 1- to 4-in. dia. and up to 10-in. length.

the steel have been boiled in 65% nitric acid for 240 hours and in both copper sulphate and sulphuric acid for 500 hours with no evidence of corrosion. Tests were made after the steel had been heat-treated at temperatures ranging from 1000 to 1625 F. Welding tests are said to have indicated that this steel has resistance to intergranular corrosion equivalent to that of stainless steels to which columbium and titanium were added and that it can replace stabilized steels for applications involving short heating times at elevated temperatures. Mechanical properties are reported to be comparable to higher-carbon grades of 18-8 stainless steel.

United States Steel Corp., 429 Fourth Ave., Pittsburgh 19, Pa.

Basket Hand Trucks Have Wheels, Swivel Caster

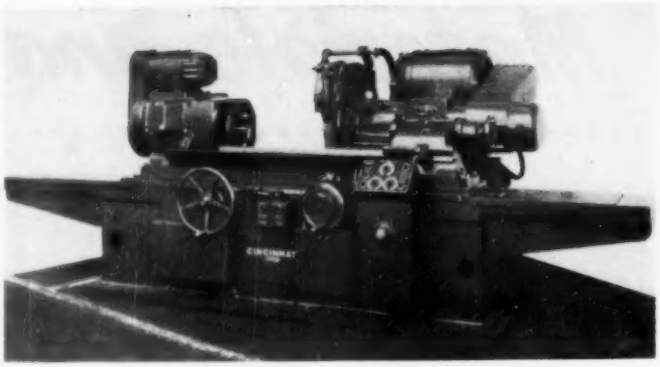
The flexible Donaldson tier truck is equipped with two wheels and one full-swiveling caster and can be moved about by one operator. These basket-type containers, provided with a self-aligning feature, can be easily handled by standard fork-lift trucks, either on the floor or stacked on each other. The units are 48 in. in length, 30 in. in width, 32½ in. high, and have a 1000-lb. capacity.

Donaldson Co. Inc., 666 Pelham Blvd., St. Paul, Minn.

Hand Sanding, Polishing Pad Fits Any Surface Contour

Wood, metal, plaster, and other materials can be worked with the flexible rubber Sandanser, hand sanding and polishing pad. Construction is such that heel rest, handle at back, and finger pocket, direct all energy to block and protect fingers. Unit comes in a kit with a lamb's-wool bonnet for polishing, felt pads for use with pumice stone or rough polishing, a small bag of pumice stone, and six sheets of various-gage abrasive paper.

Roline, Inc., Cleveland, Ohio



Foolproof Lubrication Built Into Plain Grinding Machine

The grinding spindles of these 14- and 16-in. plain grinding machines run on Filmatic bearings. Bearing lubrication is automatic, with circulating filtered oil. It precedes spindle rotation and initiates starting through a pressure switch. When the lubrication system fails, the grinding-wheel drive motor automatically stops.

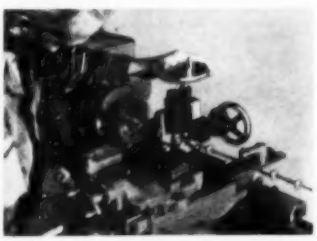
Table traverse is by means of rack and pinion and a simple drive from the motor. Traverse rates are infinitely variable between 3 and 120 ipm, through a dc motor, controlled electronically, from an ac source. The electrical system provides automatic acceleration and deceleration of the table at reversal to eliminate shock, and tarry at each end of the table stroke can be independently adjusted for a time delay of 0 to 18 sec. Coolant flow and headstock spindle rotation can be stopped and started independently, or in unison with the table traverse.

The headstock is a dead-spindle, dc-motor driven unit, with No. 13 B & S taper hole in the spindle. The table bearing is approximately equal to the length of the headstock casting. Spindle speeds are rheostat controlled, infinitely variable from 40 to 144 rpm for the 14-in. machine, and 20 to 72 rpm for the 16-in. grinder. A bellows-type dust guard is installed at the projecting end of the footstock spindle, and sheet-metal telescopic way guards at each end of the table are said to increase accuracy.

A 20-hp motor drives the grinding-wheel spindle through matched V-belts. Headstock motor is 2 hp for the 16-in. machine and 1½-hp for the 14-in. grinder. A 1-hp motor drives the table, and 1/3-hp motor each for the two lubricating-pump units.

Hydraulic profile wheel-truing fixtures, for truing the face and corners of the wheel to a variety of shapes, are available. Although these machines were rushed to completion for the Chicago Machine Tool Show, details have not previously been available.

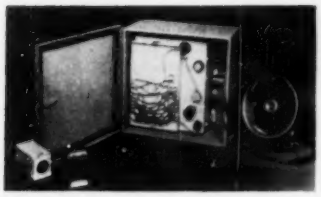
Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio.



Lathe, Screw-Machine Attachment Facilitates Precision Turning

The Karge Turnomat is a precision, lathe, and screw-machine attachment for automatic turning to extremely close tolerances. It is primarily for extremely slender turning of either shafts or tubing, and facilitates working tolerances down to tenths of thousands. The Turnomat can be used for turning plastics, fibers, and rubber, as well as metals. It will fit numerous sizes and makes of machines and, in addition to turning, will center to high accuracy, drill, ream, tap, thread, thread-chase, and work tapers down to a needle point. Patent rights for this unit were recently acquired from the Karget Son Machine Co.

Contract Div., the Todd Co., Rochester, N. Y.



Speaker System Records, Relays Safety Warnings

The Saf-T-Vox is a compact unit for recording and automatically reproducing safety messages. It enables the safety man to deliver his verbal warning at the danger point before the danger moment. Saf-T-Vox is composed of a simple mechanism for handling a magnetic tape on which messages are recorded, an amplifier, a loudspeaker, and a starting trigger. Ten messages of 10 seconds duration each can be repeated one at a time when the device is started.

American Allsafe Co., Inc., 1245 Niagara St., Buffalo 13, N. Y.

Metal Marking Tags Provide Permanent Identification

Mass-produced marking tags can be fabricated from aluminum, brass, steel, Monel, zinc, or tin plate and are furnished in any desired quantity in sizes ranging from 6 x 6 in. to ¼ x ¼ in. In addition to repeating patterns, the tags can be embossed and stamped with consecutive numbers or other code markings.

The Metal Marker Mfg. Co., 1364 E. 40th St., Cleveland 3, Ohio.

Direct-Tap Hammer Has Plastic Ends, Steel Body

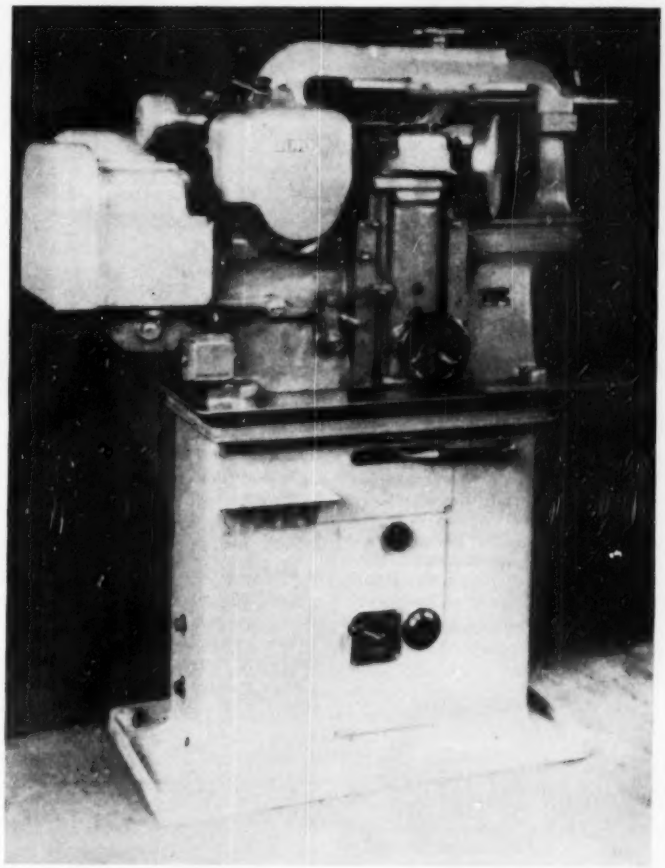
The 12-oz Tap-a-hammer, for work demanding a direct tap rather than an uncertain leverage blow, has tappers on both ends, made of a compressible plastic material, said to absorb the shock of the tap. The body of the tap hammer is of solid steel, chrome finished, with a diamond knurl in the center.

Ready Tool Co., Bridgeport, Conn.

Hot-Work Tool Steel for Extrusion Dummy Blocks, Dies

B-47 hot-work alloy steel is a combination of chromium, tungsten, cobalt, vanadium, and iron, said to have toughness and excellent resistance to shock and abrasion at elevated temperatures. It is recommended by producers for such applications as brass extrusion dummy blocks and dies, valve extrusion-die inserts, forging-die inserts, forging-press dies, and hot-punch tools. The alloy has hot hardness and good wash resistance.

Allegheny Ludlum Steel Corp., Pittsburgh 22, Pa.

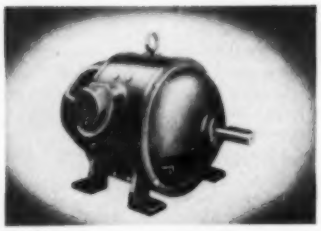


Hobbing Machine Provides Versatility, Automatic Cycle

Koepfer gear-hobbing machine is for spur, spiral, and worm gears from 3/16 to 4¾ in. dia, 82 to 12 dp. It will generate every type of gear and is specially equipped for hobbing small-diameter multiple-thread worms. The machine has an automatic cycle, including feeding to depth, feeding forward, stopping, receding of cutter, and return of carriage.

The rest of the Koepfer line consists of a number of gear- and pinion-cutting machines with and without magazine feed.

George Scherr Co. Inc., New York 12, N. Y.



DC Motors Have Prelubed, Sealed-for-Life Ball Bearings

SK direct-current life-long motors in one- to 30-hp ratings are available for constant, adjustable, or varying speed applications for either continuous or intermittent service. Prelubricated sealed-for-life ball bearings are said to provide effective lubrication without attention. No greasing program is needed for the life of the bearing. The units are designed for operation from 115, 230, 550, or 660 volts.

Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

Mercury Thermal System for Applications to 1200 F

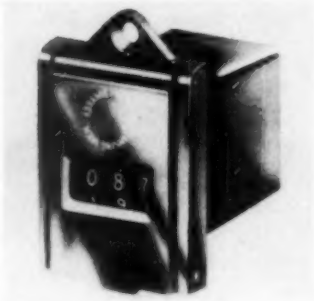
This thermal system measures temperatures above the conventional 1000 F in gas-fired ovens, annealing ovens, high-temperature blanchers, and in exhaust systems, among other applications. It embodies the Type 347 stainless-steel thermal element and compensates for varying case and ambient temperatures. Range spans of 1000, 600, and 400 F are available.

Taylor Instrument Companies, Rochester 1, N. Y.

Brake Motor and Brake Available In Hp Ratings From 1 to 60

For applications requiring frequent, instantaneous, stopping and starting the Crocker-Wheeler brake motor employs prelubricated-for-life cartridge bearings and a brake lining, said to eliminate the need for adjustment. The brake can be mounted, on drip-proof, splash-proof, or totally inclosed motors to make a matched brake motor in ratings from 1 to 60 hp. Manufacturers say the bonded-metal brake linings are not affected by heat, cold, dampness, salt water, fungi, grease, or oil. Brake disks are of all-metal construction.

Crocker-Wheeler, Ampere, N.J.



Tiny Precision Counter Tallies 1200 Counts per Min

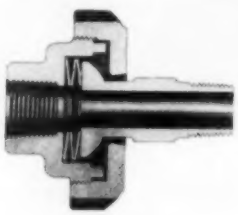
Measuring 1 in. high, less than 2 in. deep, and weighing two oz, these three- and four-digit precision counters can add or subtract, recording a maximum of 1200 counts per min. Each wheel can be reset manually. Counters can be connected in vacuum-tube plate circuits, or operated by a contacting device. Twenty-four or 110 volt ac or dc coils are available.

Abrams Instrument Corp., Lansing 1, Mich.

Special Shapes Available In Metal Strip Material

A wide variety of special cross-sectio shapes are available in Monel, nickel, Iconel, and Almet stainless-steel strip material.

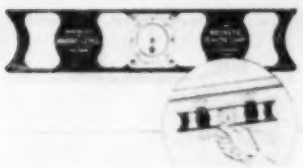
Alloy Metal Wire Co. Inc., Prospect Park, Pa.



Turning Torque Reduced in Rotary Swivel-Pipe Joint

By eliminating wedge action of the ball against the gasket, the turning torque in this joint is almost completely eliminated. The ball is held in place by a Belleville spring. A small amount of side flexibility is said to reduce the possibility of wear or breakage from side strain. Successful performances have been reported at continuous rotation up to 30 rpm and the joint is said to perform without leakage at extreme temperatures. Extra-heavy models are available for extreme pressures and vacuums. Joints are available in 90° angle and straight designs in $\frac{3}{8}$- to 1-in. pipe sizes.

Barco Mfg. Co., Dept. 11, 1801 W. Winnemac, Chicago 40, Ill.



Magnetic Level Clings to Round or Flat Surfaces

Equipped with two Alnico permanent magnets, the Mago-Level sticks to either round or flat surfaces at any angle. It has a clock-faced angle gage with balanced gravity needle which determines any angle from 0 to 360 F. The frame is high-tensile alloy aluminum and the dial face is covered with plastic windows. The level weighs 10 oz, measures 9 x 2 in., and costs $5.95 fob Cleveland, Ohio.

The Buckeye Plastic Corp., 740 Superior Ave., N.W., Cleveland, Ohio.

Oakite Composition Frees Spray Booths From Overspray

Oakite Composition No. 45 is to keep walls and working surfaces of water-washed paint spray booths clean and free of overspray. Manufacturers report that it prevents adherence of overspray to aprons, baffles, lines, and flood sheets as well. It is also used for stripping organic finishes which coat paint racks, hooks, and similar spray-booth equipment.

Oakite Products Inc., 124 Thames St., New York 6, N. Y.

Low-Hydrogen Electrode Covers Wide Range of Uses

Choice of 14 different electrodes, each recommended for a different use, is offered in the P & H low-hydrogen electrode line. As-welded tensile strength varies from 74,000 to 142,000 psi and yield strength from 64,000 to 125,000 psi.

Harnischfeger Corp., Milwaukee 14, Wis.

For a Real "Beauty Treatment" *both* in Manufacturing and in Merchandising

. . . top equipment-makers use AMERICAN PHILLIPS SCREWS

BEAUTIFY COSTS! Assembly costs never look so good as when they're *slimmed down to 50% of what they used to be*... simply by equipping all assembly departments with skid-proof, slash-proof American Phillips Screws. That's why leading makers of beauty-shop equipment use this modern fastening that saves half the time and the spoilage imposed by slotted screws.

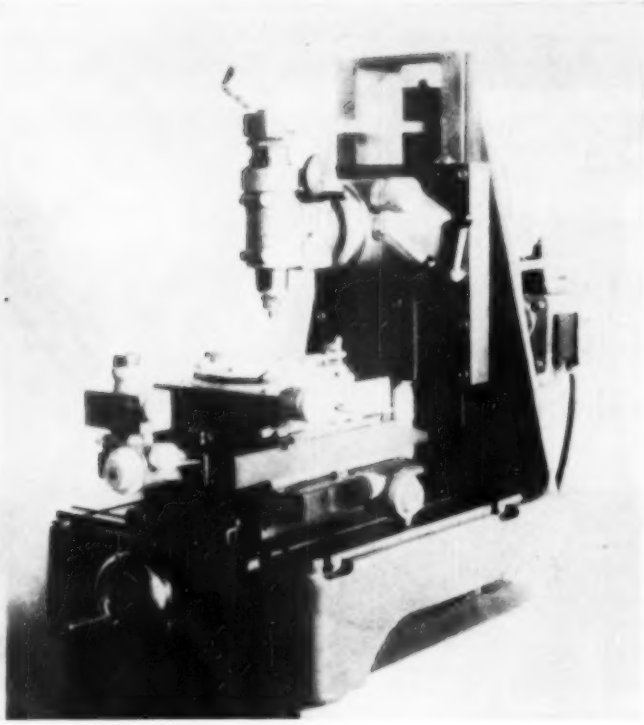
BEAUTIFY SALES! The modern mark of the American Phillips crossed recess is a buy-sign that the public has learned to accept with confidence on everything from autos to model railroads . . . and that industry has long since accepted (in fact, *specified*) on everything from trucks to machine tools. That mark means that the product is built right, all the way through. Yes, American Phillips Screws are potent sales-promoters as well as cost-cutters. Get both these advantages *for your own product.* Write and tell us to prove that "American Phillips Screws always cost least to use."

AMERICAN SCREW COMPANY, Providence 1, R. I.
Plants at Willimantic, Conn., and Norristown, Pa.
Warehouses at: 589 E. Illinois St., Chicago 11 — 502 Stephenson Building, Detroit 2

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN PHILLIPS *Screws*

ALL TYPES
ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



Leitz Optical Jig Borer Provides Microscopic Inspection

The spindle on this jig borer is a combination drilling spindle and microscope. When the drill is removed the microscope, with concentric circles, becomes operative. The work may thus be spotted, drilled, and inspected without removal from the table. For holes up to ⅛ in., flat drills are used and for larger sizes up to ½ in., an adjustable boring tool is furnished. Standard equipment includes a spring-loaded scribing tool for layout work.

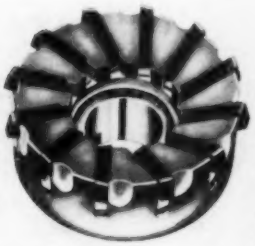
Longitudinal and cross-slide are set by built-in precision glass scales which are read with a microscope piece, graduated in 0.0005 in. By shifting a lever the operator can read both the length and cross measurements in one eyepiece without moving from his position. There is no variance between workpieces of different weight because the optical setting does not involve measuring pressure differences due to weight. For highest precision, work size is limited to 6 x 6 in.

George Scherr Co. Inc., New York 12, N. Y.

Oil-Impregnated Metal Bearings Have Greater Oil Content

The sintered-metal Haller Oil Well bearings embody cavities of uniform size in the center of the bearing wall. As oil or grease is impregnated into the metal by static pressure, it fills the cavity as well as the pores in the body itself. This is said to result in a greater oil content than is possible in conventional bearings of this kind. This, in turn, is reported to provide for greater loading and less freezing. The bearings are supplied in three types. The pocket type, which has an open cavity, is particularly suited for heavy-load bearings. In the sponge type bearing, the pocket is filled with sponge iron which provides capillary action for retaining oil. This bearing is recommended for operations subjected to heat. In the thin-wall bearing a group of small holes replaces the pocket so as not to weaken the bearing wall.

Michigan Powdered Metal Products Co., Inc., Northville, Mich.



Adjustable Solid-Carbide Blades Installed in Milling Cutter

Blades in this milling cutter are locked by means of setscrews which move locking wedges in for locking and out for blade removal. This method is said to permit a greater number of blades in a given size of cutter. It also provides greater economy in blade life as blades can be used down to approximately ½-in. length. Blades also can be moved forward in the direction of greatest wear. These milling cutters are available in sizes ranging from 6-in. dia with 12 teeth to 14-in. dia with 28 teeth.

Super Tool Co., 21650 Hoover Road, Detroit 13, Mich.

Power-Hacksaw Blade Designed for Production Work

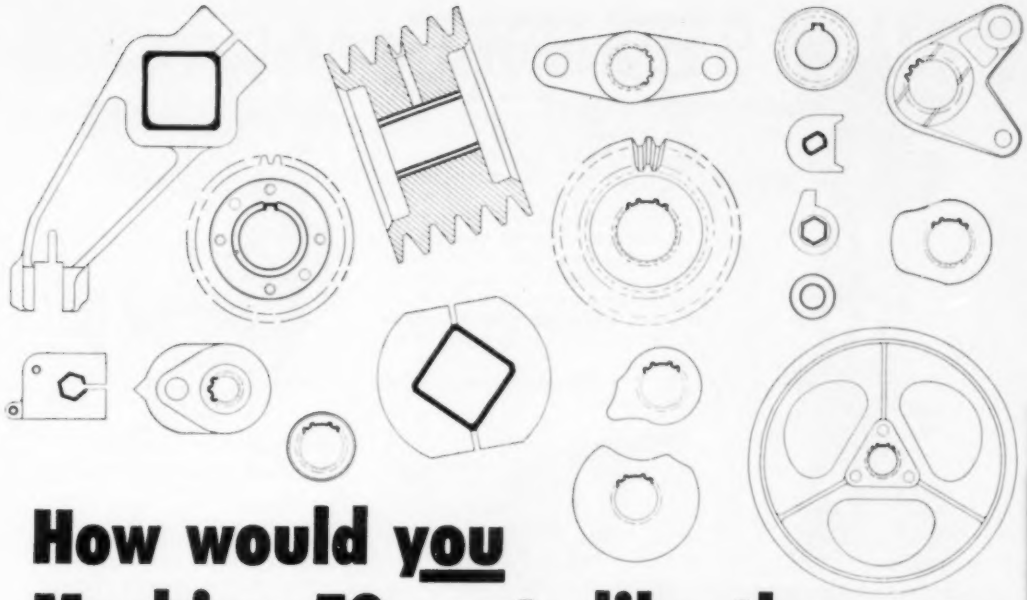
The Red Rocket is a power-hacksaw blade, said to be capable of withstanding heavy feeding pressures because of its flexibility and toughness. The blade is recommended by manufacturers for production work.

W. O. Barnes Co., Inc., Detroit, Mich.

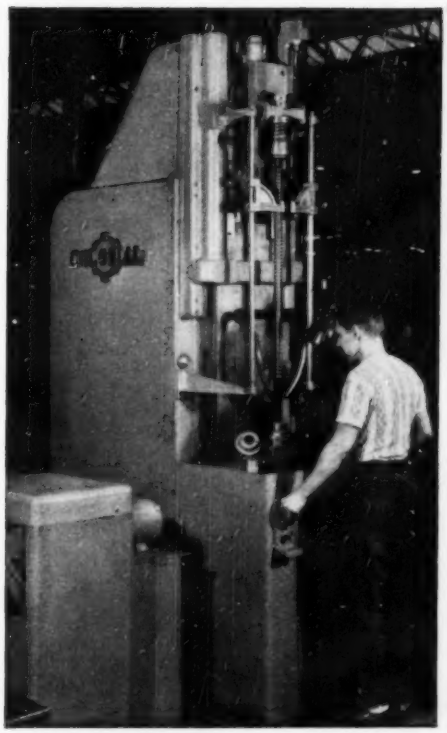
Tungsten-Carbide Die Nibs Supplied for Tube Dies

Rough-cored uncased die nibs for collapsible tube dies are stocked in eight sizes ranging from ⅝- to 1½-in. ID, and in the various grades of tungsten carbide. It is expected that in the early future punch nibs in the equivalent sizes will be added to the standard items stocked.

Tungsten Alloy Mfg. Co., Inc., Newark, N. J.



How would you Machine 59 parts like these ...in short runs?



Warner & Swasey does it by broaching —using only:

ONE machine—a Colonial 10-ton 54″ stroke Pull-down machine with automatic broach handling;

THREE base fixtures—designed and built by Colonial Broach Company;

. . . plus quick-interchangeable fixture adapters for the different parts.

By "designing for broaching," Warner & Swasey assured itself of both high precision and fastest possible metal removal.

Working with Colonial Broach engineers, Warner & Swasey added to this the benefits of low tooling, set-up, and change-over costs.

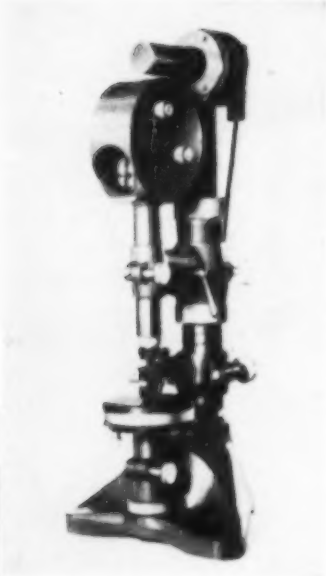
Whether mass production or job-lot runs are your problem, Colonial can show you the way to

"Do it for less"

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13



Optical Comparator Can Be Read to 10 Millionths

The optical scale on the Leitz Opti-Comparator has a total range of 10 thousandths of an inch, divided into 200 parts of 50 millionths each. Graduations are said to be far enough apart so that 10 millionths can be estimated safely. The unit embodies a measuring pressure adjustment from 2 to 7 oz, said to be important when thin parts such as films are being handled. The Opti-Comparator employs an optical system including a collimator and frictionless, weightless, beam of light. The unit is set to zero by means of precision gage blocks.

George Scherr Co. Inc., New York 12, N. Y.

Cast-Iron Electrode Has 99% Nickel Core

For general welding of cast iron, especially wherever free machinability and color match are required, this 15-in. cast-iron electrode is recommended. It is designed for ac or dc straight or reverse polarity, and amperages range from 40 to 180 depending upon the diameter. Among advantages claimed by manufacturers are a finished job practically free of spatter, flux residue more easily removed, and the unit is said to weld cold and avoid cracking and distortion.

All-State Welding Alloys Co., Inc., 273 Ferris Ave., White Plains, N.Y.

Controlled Chemical Treatment Puts Bright Finish on Brass Strip

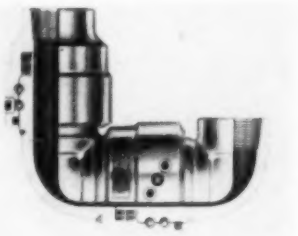
The Rockwell cyanide degreasing installation combines a series of operations including treatment in a chemical solution, hot water and soap rinses, and uniform drying to produce clean, bright, light-gage brass strip up to 27-in. width. The entire installation is 67 ft long and consists of a four-brush cleaning and cyaniding tank, cold water spray unit, hot water tank, soap tank, recirculating electric dryer, and winding reel. It is designed for continuous operation at speeds up to 250 ft per min.

W. S. Rockwell Co., 200 Eliot St., Fairfield, Conn.

Lightweight Electric Shears Cut 14-Gage Hot-Rolled Steel

Here are some lightweight, portable, electric shears that cut up to 14-gage hot-rolled steel at a speed of 15 to 20 fpm. A blade motion which feeds in the work, facilitates cutting of straight lines, curves, angles, and notches to close accuracy. The universal motor is full ball and roller bearing construction. Yoke is made of special heat-treated alloy steel and the motor operates on either dc or ac., 60 cycles or less. Minimum radius is ½ in. at the left hand and 1¼ in. at the right hand. Net weight is 9½ lb.

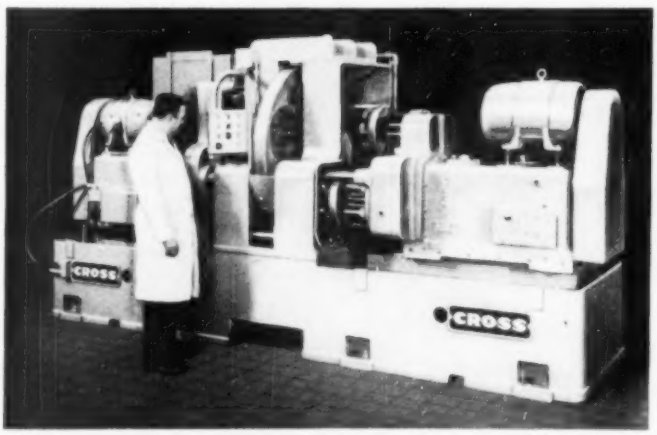
Stanley Electric Tools, New Britain, Conn.



Ball-Bearing Pipe Coupling Holds Fluids Under High Pressure

The All-Flex ball-bearing swivel pipe coupling handles fluids under high pressures through a pipe that rotates a full 360° in all planes. It is designed for an average speed of rotation not to exceed 60 rpm. The All-Flex double, metal-backed packer assembly handles pressures from vacuum to 12,000 psi and the full range is automatically covered without manual adjustment of the packing. Couplings are available in a wide range of sizes for working temperatures up to 225 F. They have no projections and are free from bolted flanges, threaded sleeves, locking rings, and keys.

Gil-Lair Products, Inc., 81 Masonic Court, Pasadena 3, Calif.



AUTOMOTIVE FLYWHEELS are drilled, chamfered, and reamed at a rate of 140 pieces per hr at 100% efficiency on this special machine. It is a 5-station index-trunnion unit with a fluid motor for indexing. Only one unskilled operator is required. He merely loads and unloads and presses the cycle button—*The Cross Co., 3250 Bellevue, Detroit 7, Mich.*

Which way do you DRILL DEEP HOLES?

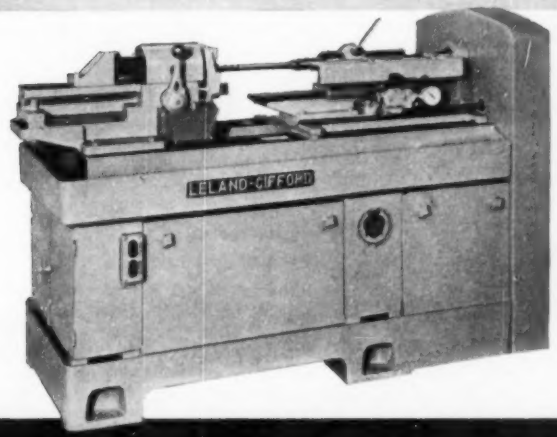
The "DRILL-KILLER" way

Keeps the drill cutting until it cries "uncle". RESULT: flutes and holes clogged with chips, coolant crowded out or burned away, drills run off, cut slowly, dull quickly, break frequently. Production down, costs up.

The Safe, Accurate LELAND-GIFFORD WAY

Patented *Step by Step* Hydraulic Feed automatically retracts the drill at frequent, predetermined, *safe* intervals to clear the chips and replenish coolant. RESULT: straight holes, drills stay cool and sharp, more holes drilled between grinds, less drill breakage. Production up, costs down.

If you drill holes from 4 to 60 or more diameters in depth, it will pay you to look into the LELAND-GIFFORD METHOD. Write for complete information.



A Leland-Gifford Single Spindle, Self-Contained, Horizontal Deep Hole Drilling Machine. The patented Leland-Gifford *Step by Step* Hydraulic Feed can be furnished for angular or vertical as well as horizontal deep hole drilling—with infinitely adjustable feed rate and overload protection plus automatic stop and reset — in steps and total traverses to meet your requirements.

PRODUCTION MEN

Get This Handy Slide Rule

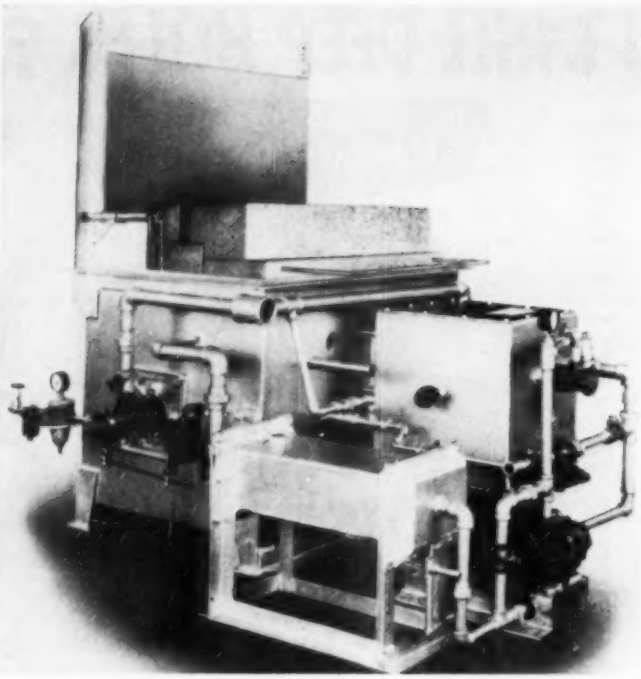
A valuable aid in figuring costs and setting production schedules. Quickly gives time required to drill holes of any size and depth in any material. It's free. Write the nearest office.

LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U. S. A.

CHICAGO 6, 565 W. Washington Blvd.; DETROIT 26, 1533 Dime Bank Bldg.; CLEVELAND 1, P. O. Box 5547; NEWARK 2, Industrial Office Bldg.; ROCHESTER 4, Commerce Bldg.; LOS ANGELES 14, 724 So. Spring St.



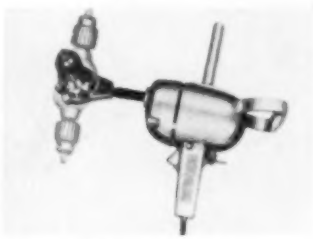
Lithium-Atmosphere Forge Furnace Provides Protection From Scaling

Protection up to 2400 F against scaling during heating of steel for forging or pressing, annealing or brazing ends or sections of bars, and band heating, is provided in this vertical-slot forge furnace without need for specially prepared atmospheres. The slight coating of lithium, imparted to the work during heating operations, prevents secondary oxidation to 2200 F during the cooling down period. This protection against oxidation in large furnaces is said to cost as low as five cents per ton of forgings.

The lithium vaporizing chamber, built with the furnace, is a refractory-lined steel shell provided with gas burners or electric heaters. The chamber contains a tubular lithium vaporizer in which a cartridge of lithium compound is vaporized by its own gas or electrical heating equipment. Combustion gases are used as the carrier.

The heavy-duty furnace contains a shell of welded steel plate, lined with 4½ in. of hard-burned brick backed up by refractory insulating brick. Automatically controlled oil or gas burners fire directly into the combustion chamber. Furnaces are available in single- and double-slot types. Single slot sizes vary from 18-in. width x 12-in. depth x 27-in. height to 64-in. width x 20-in. depth x 40-in. height. Double slot sizes are available in six slot sizes ranging from 18 x 12 x 27 in. to 48 x 20 x 40 in.

The Lithium Co., 111 Sylvan Ave., Newark 4, N. J.



Swivel Drillhead Designed for Tight Spots

Capable of swiveling 360°, this portable-tool attachment for ½-in. drills is for operations in hard-to-get-at spots. The angle head is quickly removable when desired to convert the tool into a conventional ½-in. drill. The head will fit any make of ½-in. drill equipped with Model 33 B Jacobs Chuck. The head weighs 2 lb, has 2-to-1 gear ratio, and at right angles measures only 7½ in. wide. No-load spindle speed on the head is 275 rpm.

Cummins Portable Tools, Div. of Cummins Business Machine Corp., 4740 Ravenswood Ave., Chicago 40, Ill.

Adjustable-Hole Locators Check Variable Hole Sizes

Operated by MP adjustable involute teeth, evenly spaced pins on this hole locator adjust themselves to varying sizes of holes, accurately centralizing parts for checking faces and diameters in relation to the holes. Under certain conditions such locators have been used for light machining operations. Drive must come from the work spindle to the part. Locators are made with adjustments from 0.008 to as much as 0.092 in. depending upon the application. MP adjustable hole locators have been adapted as stud mandrels in checking fixtures for checking diameters and faces in relation to bore.

MP Tool & Engineering Co., 2339 Caniff Ave., Detroit 12, Mich.

Hyster Industrial Lift Truck Handles Up to 2000 Lb

Powered by a Wisconsin air-cooled engine, Model 20 will handle loads up to 2000 lb. Among the changes in the engine, are a new intake manifold, redesigned shrouds which pull air from the sides of the machine rather than the top or bottom, a new electric fuel pump, and a new distributor. Tilt control of the uprights is controlled through double-acting hydraulic cylinders for both directions of tilt. The truck may be fitted with special-purpose attachments, such as load grab, paper-roll grab, scoops, booms, guards, and towing hooks.

Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon

WORLD-FAMOUS SCHWINN-BUILT BIKES are known for high-quality workmanship. 3M Abrasive Belts give superior finish to frame members, other internal parts.

GROOVED BUFF CONTACT WHEEL permits easy polishing of contours on tough crank forgings. 3M Abrasive Belts give smoother finish in half the time of former methods.

Schwinn Saves $42,000!

Finishing costs cut 50% on just one of several belt grinding operations

Finishing costs on bicycle crank forgings dropped from 14¢ to 7¢ per unit when Arnold Schwinn & Co., America's largest bicycle manufacturer, converted to belt grinding. 3M Abrasive Belts give faster rough cutting, finer finishing, save $42,000 a year on this one operation alone.

3M Methods Engineers are trained to analyze your production problems in rough grinding or finishing of metals, wood, glass, or plastic. They can show *you* savings . . . increase the quality of your workmanship. Write today for complete information.

MAIL COUPON FOR FREE BOOKLET full of money-saving shortcuts for your grinding and finishing operations.

Address: Minnesota Mining & Mfg. Co., St. Paul 6, Minn.

☐ Please send me a copy of your "Step Up Production" booklet.

☐ Please send a 3M Methods Engineer to call on us.

By.....

Firm.....

Address.....

City..... *Zone*..... *State*..... AM-250

3M® ABRASIVE BELTS

Made in U.S.A. by **MINNESOTA MINING & MFG. CO.** St. Paul 6, Minn.
Also makers of "Scotch" Brand pressure-sensitive tapes, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Adhesives

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.* • *In Canada:* CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

Cold-Forged Casters Produced With 175- to 650-lb Capacities

Industrial casters with forged-steel strength but manufactured at stamped-steel production costs are manufactured in five wheel types: nickel-steel, Durastan plastic, molded-on rubber, cushion, or hard rubber. Wheels are in 3-, 4-, 5-, or 6-in. dia and load capacities vary from 175 to 650 lb. A dust cap prevents dirt from entering raceways and provides a means of convenient lubrication. The top plate, yoke base, and button of the Series 40 casters are cold forged.

The Rapids-Standard Co., Inc., Dept. CF, 342 Rapistan Bldg., Grand Rapids 2, Mich.

Lubricant Additive Said to Cut Friction, Protect Parts

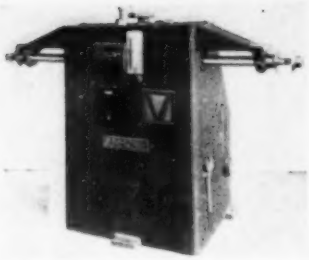
Power Ball is an oil base which, added to any lubricant, creates a thin lubricating film on lubricating parts, reducing friction. Manufacturers say this lubricant will cut electric power consumption from 5 to 15%. It is claimed that the film created by Power Ball can be removed only by use of a cutting stone. For most applications Power Ball is used in amounts of one part to ten parts of regular lubricant.

Friction Proof Oil Corp., 200 Fifth Ave., New York 10, N. Y.

Austenitic Stainless Steel Facilitates Heading, Upsetting

Cold-headed bolts and recessed head screws, cold upset and punched nuts, and parts that require severe cold coining and extrusion, can be manufactured from Carpenter's stainless No. 10. Outstanding characteristics of this chrome-nickel austenitic stainless steel is that it is said to work harden much slower than the conventional 18-8 stainless. Analysis of the steel shows 0.08% max. carbon, 16.00% max. chromium, and 18% nickel. The material is also said to remain non-magnetic after severe severe working.

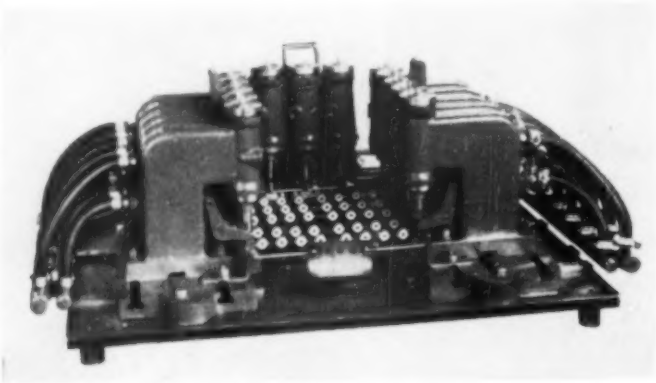
The Carpenter Steel Co., Reading, Pa.



Buffing, Polishing Machine Embodies Underslung Spindle

The underslung-spindle design of this unit is said to provide unusual rigidity in the relatively long thin spindle. With this construction neither depth nor width of the overarm need be restricted. Manufacturers point out that there are no structural interferences for spacing other bearings along the underside of the bearing support or for locating the motor and power transmitting details. These Marschke buffing machines are made with one or two spindles in sizes with motors ranging from 1 to 30 hp.

Vonnegut Moulder Corp., Indianapolis, Ind.



Multiple-Head Pneumatic Riveters Made to Suit Special Jobs

Standard heads on this riveter may be spaced to as close as 2¾-in. centers. A foot-controlled single-solenoid air valve, operating in conjunction with an adjustable timer for the riveting cycle, handles the air supply. By adjusting the air pressure and the riveting time the desired peening effect can be closely controlled. On this 13-head machine for assembling electric-stove heating-element frames, each head is provided with a pneumatic clamp to hold the part in the locating fixture.

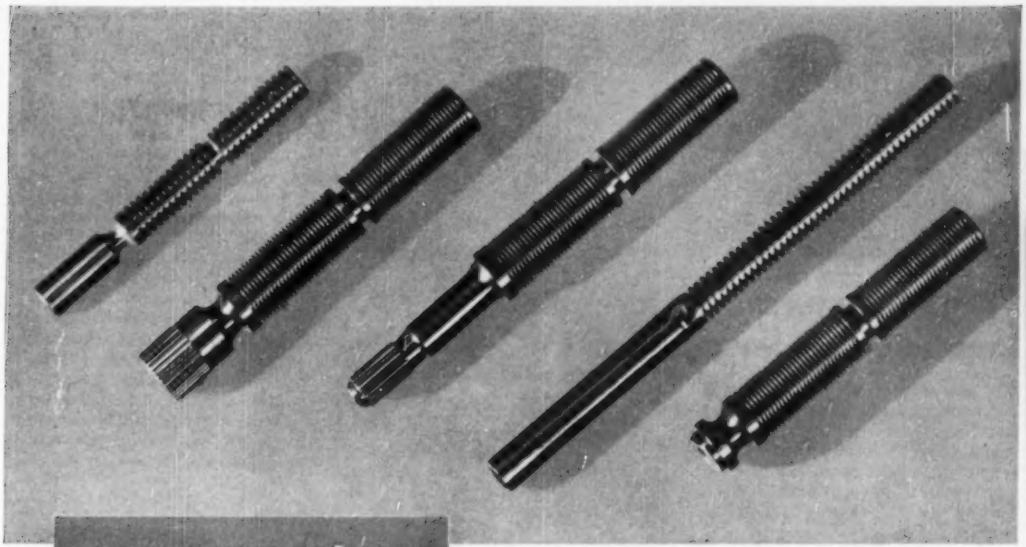
Hill Machine Co., Dept. AM, 1041 W. State St., Rockford, Ill.

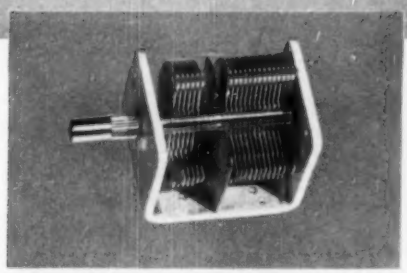
Molded-Rubber Jiffy Tire Made to Fit Any Bandsaw Wheel

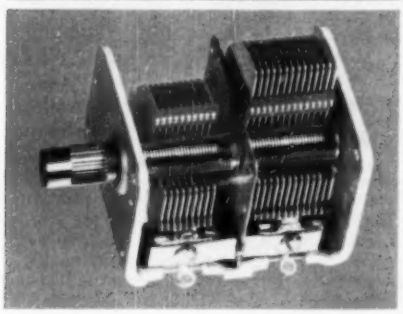
Made in sizes to fit any bandsaw wheel, the Jiffy tire is installed without the use of cement, glue, rims, bolts, or special tools. The inside of the tire is rubbed with soap suds after which the wheel is tapped into the tire with a rawhide mallet. When worn, the tire is cut off with a hacksaw. Grip-tight cleats are said to assure operators of complete working safety without fear of the tires breaking.

The Carter Products Co., Grand Rapids, Mich.

For Tough Machining Jobs, Get REVERE FREE-CUTTING BRASS







Above, Model CS, smallest condenser, air space .009". Below, Model B, largest, air space .013". Rotor shafts, shown in top illustration, are Revere Free-Cutting Brass, plates aluminum. Made by The American Steel Package Co., Defiance, Ohio, an important supplier to the electronics industry.

HERE are several examples of the fact that Revere Free-Cutting Brass is really good. These rotor shafts for variable condensers are cut on automatic machines at 3600 r.p.m. Circular tools are used to cut the concentric slots which are .050" deep. Only one cut has to be taken. Approximately 425 pieces are produced per hour on a 6-second cycle. The American Steel Package Company, Defiance, Ohio, produces a number of different condenser models, with air spacing ranging from .009" up to .042". The slots in the shaft of Revere Free-Cutting Brass are all of the same width, regardless of air spacing, namely .014" plus or minus .0002". It takes good machines, good tools, good men, and good metal to work that closely. A report from a Revere Technical Advisor who had collaborated with the company states: "Customer is outstanding in his praise of Revere Rod." . . . If you have a problem in the machining of brass, why not give Revere an opportunity to work with you? The Revere Technical Advisory Service is at your command.

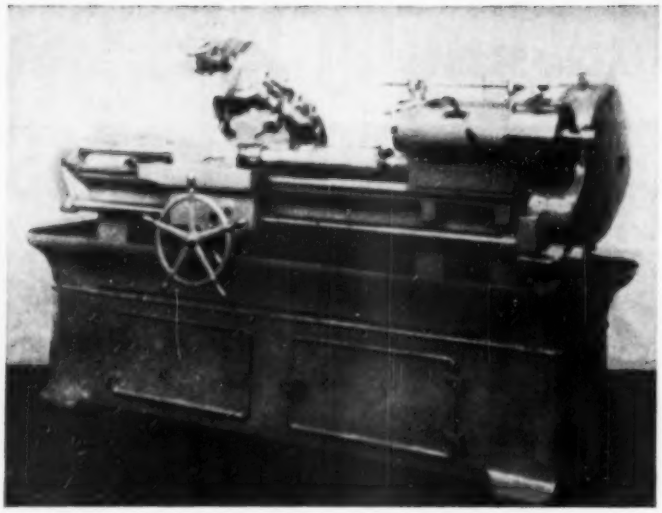
REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.
Sales Offices in Principal Cities, Distributors Everywhere.



Thread-Generating Machine Employs Circular Cutter

Cornelis thread-generating machine is for cutting lead screws, worms, and threads by a generating method using a circular cutter. The principle employed differs considerably from the known methods of milling, lathe cutting, or die chasing. Single or multiple start threads are cut in a single operation. No indexing is required thus eliminating spacing errors.

The shape of the thread is generated with precision and no special skill is required to operate the machine. Four standard lengths are 18-, 37-, 77-, and 116-in. capacity at 4½ in. dia, 4 dp, 30° max helix angle. Three hp are required.

George Scherr Co. Inc., New York 12, N. Y.

Differential Relief Valve Eliminates Valve Chatter

This adjustable differential relief valve is designed expressly for use in high-pressure, oil-hydraulic control systems. Inherent design characteristics are said to entirely eliminate objectionable valve chatter. The differential piston of the VR Series valve reduces the effective area of the main poppet valve without reducing actual flow area. VR Series valves are available in capacities from 5 to 80 gpm and in pressure-operating ranges between 400 and 1650 psi.

Hydraulic Equipment Co., Cleveland 17, Ohio.

Contour-Measuring Machine Provides Record of Results

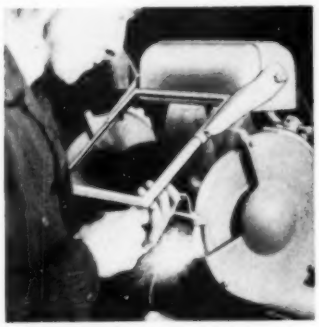
Blades, cams, dies, and odd shapes are checked for contour in a matter of minutes on the Vizo-Graf measuring machine. In addition, results are recorded on a printed chart. The charts are said to facilitate interpretation to within several ten-thousandths of an inch. During the inspection cycle two narrow lines of light indicate the changing thickness of a blade on a translucent scale in front of the operator. In operation the work piece is passed between two sensitive probes which transfer the dimensions through a mechanism that records the contour on photographic paper, magnified at 20 to 1, 60 to 1 or any magnification in between. At the same time the machine is printing vertical and horizontal grid lines. All lines are spaced at predetermined numbers of thousandths of inches so that interpretation of the finished chart is made very rapidly by counting these lines. The machine does not use master charts or plates. Actual measurements of a piece are recorded for comparison with the original blueprint or standard dimension applicable to the part.

Measuring Machines, Inc., 20350 Center Ridge Road, Cleveland 16, Ohio.

Carbon-Graphite Material Developed for Bearings

Purebon No. 5 is composed of extremely fine well-bonded particles which make it highly resistant to wear and abrasion. Manufacturers say it is non-toxic, does not rub off, and can be run dry up to certain limits of speed and loading without undue wear or galling of the metal shaft. It is said to be unaffected by most strong acids, alkalis, and other corrosive liquids, and is reported not to melt, or seize, or change shape when subjected to high temperatures. It can be molded to size on very small bearings and is said to provide a low cost bearing material.

Pure Carbon Co., St. Marys, Pa.



Illuminated Safety Shield Insures Operator Protection

Mercury switches on the Electro-Lock safety shield control electrical circuits to both the shield's lights and to the starting switch. The latter insures that the machine will not start when the shield is out of a completely protective position. More than 60 sq in. of uninhibited view are provided by the shield. The plain protective cover glass on the work side is easily replaced when it becomes pitted or scarred.

Junkin Safety Appliance Co., Inc., 930-36 West Hill St., Louisville 8, Ky.

HJALMER ELLSTROM, *(1863-1942)— Inventor of the Gage Block, originator of today's world standard of measurement. Patience was his creed, accuracy his goal. Working in Eskilstuna, Sweden during the early 1890's, he alone developed and perfected the instruments and techniques... then alone he created the first gage blocks accurate to the infinitesimal millionth part of an inch.*

An Ellstrom Measured in Millionths more than half a century ago—

Ellstrom Chromium Plated Gage Blocks have been described by users as "the best all-around gage block in the world." And for good reasons, too. For aside from the fact that they wear 5 to 20 times longer than ordinary steel blocks, they bring you an unparalleled heritage of precision. It was an Ellstrom who invented the original gage blocks accurate to a millionth part of an inch. And it was an Ellstrom too, three generations later, who first applied chromium to gage blocks to give you longer wearing millionths without loss of accuracy. Today, every Ellstrom Chromium Plated Gage Block carries a positive guarantee of specified millionths. And this warranty, made without conditions or reservations, is backed by the entire resources of Dearborn Gage Company and the reputation of Ellstrom ... *measuring in millionths for three generations.*

DEARBORN GAGE COMPANY

22035 BEECH STREET • DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks

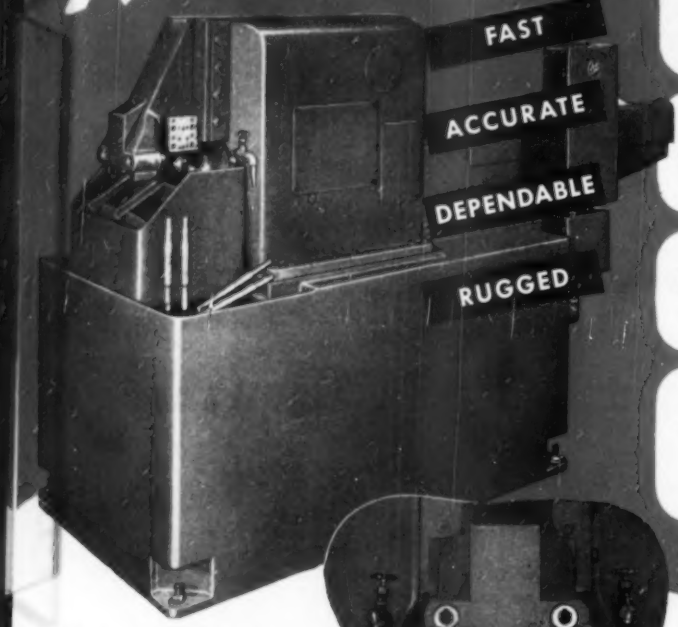
The New Motch & Merryweather Automatic

FAST

ACCURATE

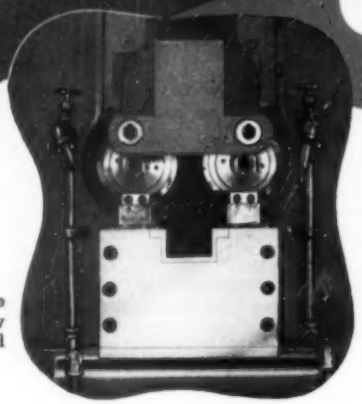
DEPENDABLE

RUGGED

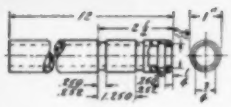


The new M. & M. Automatic is available as a bar-feed or hopper-loaded machine.

Illustrated at right are spindles and heavy duty forming slides with guard removed.

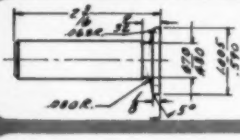


STUDY THESE TYPICAL JOBS

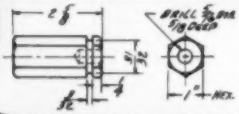


Operation: Form grooves, chamfer O. D., face and form internal groove.
Material: Seamless tubing—mild steel ⅛" wall.
Production: 1100 pcs/hr. @ 100% eff.

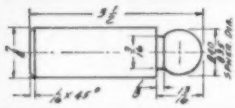
Operation: Form snap ring grooves, grease groove, chamfer and drill.
Material: AISI-1015.
Production: 720 pcs/hr. @ 100% eff.



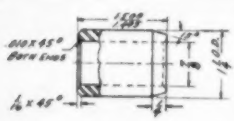
Operation: Face head, form back of head and neck.
Material: SAE 5120.
Production: 720 pcs/hr. @ 100% eff.



Operation: Form chamfer, groove, drill and cut off.
Material: Aluminum F.M.
Production: 680 pcs/hr. @ 100% eff.



Operation: Form diameter, groove, chamfer and cut off.
Material: Aluminum F.M.
Production: 510 pcs/hr. @ 100% eff.



Operation: Form chamfer both ends O. D. Break edges I. D. and cut off.
Material: Seamless tubing—SAE 1020.
Production: 600 pcs/hr. @ 100 eff.

The drawings above can only hint at the possibilities of the new, proven Motch & Merryweather Automatic. Study them closely, compare with your own requirements, and then

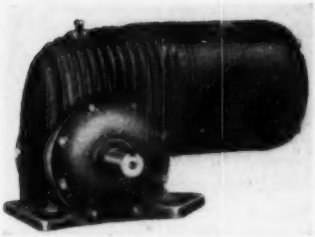
WRITE US FOR FULL INFORMATION, describing your needs.

Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY • 715 PENTON BUILDING, CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT



Century 1½-Hp Gear Motor Has Only Two Moving Parts

Range of speeds that may be obtained in these Century 1½-hp motors is from 25 to 280 rpm. The armature shaft and output shaft are the only two moving parts in the unit. Worm gears are employed and only four bearings, two ball and two roller, are used.

Century Electric Co. (Gear Motor Div.) 1806 Pine St., St. Louis 3, Mo.

Solenoid Control Valve Gives Fast Action at Low Current

SA control valves employ a small solenoid, traveling through a ⅛-in. stroke, to move a small pilot-valve plunger applying air to the operating piston to move the main valve plunger. When the solenoid is de-energized, the pilot cylinder is exhausted through the pilot valve, permitting the main plunger to return due to the cylinder pressure on the opposite end. Reduced amp requirement of the solenoid permits operation with standard pilot switches, simplifying electric-control circuits. Valves can be operated at very high speeds at normal air pressures. They are furnished in two-way, three-way, four-way, and five-way designs and ⅜-, ½-, ¾,- and 1-in. sizes. They handle air to 200 psi and oil and water to 250 psi.

C. B. Hunt and Sons, Inc., Salem, Ohio

Weldrawn Titanium Tubing Available in Limited Amounts

The limited availability of Weldrawn commercially cured titanium tubing is announced by the Superior Tube Co. Standard tempers, annealed, half hard, and hard drawn are being offered. The mechanical properties of annealed tubes are ultimate strength, 80,000 psi max., yield strength, 40,000 psi min.; elongation is 2½ in., 25% min.; hardness, Rockwell B, 95 max. Sizes produced range from ¾- x 0.049-in. wall down to ⅛- x 0.010-in. wall. Analysis limits require 99.5% minimum titanium.

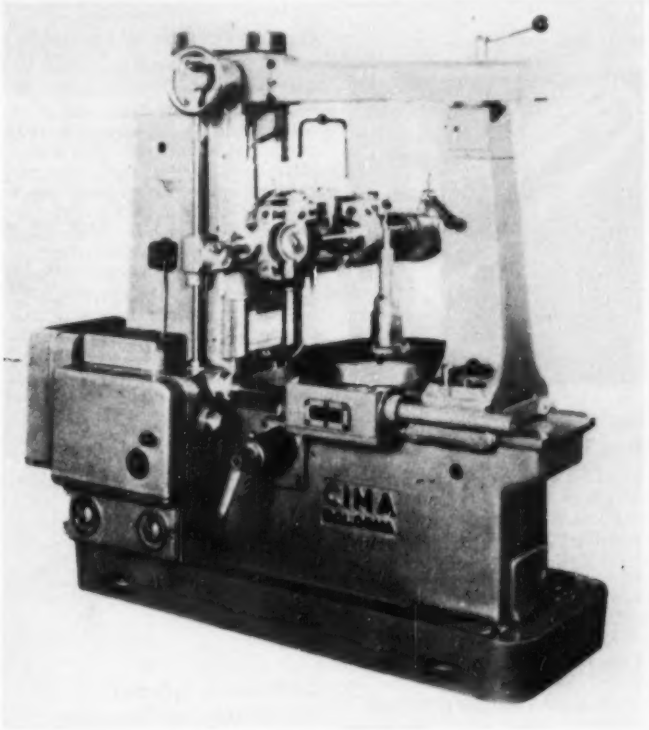
Superior Tube Co., Norristown, Pa.

All-Steel Stock Racks Handle Coil Steel or Wire

Concave-shaped guards on these all steel stock racks insure snugly resting loads and eliminate contact with dust and dirt and danger of the load falling when rack is lifted. Units are handled by fork truck or overhead

lifting equipment and racks are built to any size and load capacity required.

Palmer-Shile Co., 16019 Fullerton, Detroit 27, Mich.



Gear-Hobbing Machine Cuts Spur, Spiral, Worm Gears

The cutter head of this universal machine is provided with a slide which feeds the tapered hob tangentially. This method is said to generate worm gears with multiple threads but avoids ridges and flats on the side of the teeth. Simple, easily-made fly cutters can be used for generating accurate worm gears for which no hob is available or where the quantity of work will not justify the expense of a special hob. Spur and spiral gears can also be cut with this machine.

George Scherr Co. Inc., New York 12, N. Y.

Raw-Material Calculator For Metal Rod and Flat Stock

For production men, purchasing agents, engineers, and estimators, this raw-material calculator is made to do away with charts and reference books. It is used to determine raw-material requirements directly from blueprints or a sample piece. One setting of the slide is all that is necessary for a given part. Raw material required is read directly in pounds required per 1000 pieces. The unit is approximately 11-in. long.

H. R. Potter Co., P.O.Box 318, Montague Place, Montclair, N.J.

Chipping-Hammer Line Offers 15 Power Sizes

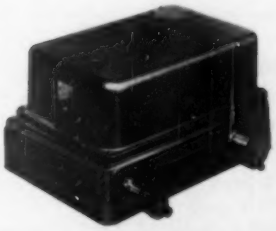
Controlled-power chipping-hammer line offers a selection of 15 power sizes and five basic hammer sizes. Each hammer size is available in normal-cut, extra-cut, or super-cut models. All parts of excessive wear have been subjected to the Iramet hard-surfacing process. Three different handle designs are available, all of which lock in place in a positive manner. The unit is of front-end design to allow more chisel playoff.

Ingersoll Rand Co., Phillipsburg, N.J.

Grinding Compound, Cutting Oil Combined in Coolant Base

Safco 770 Compound has the consistency of a liquid paste and is recommended for both grinding and machining operations. It is a soluble all-purpose coolant base which is mixed with water in ratios as high as 80 to 1. It is reported to prevent wheel loading, reduce wheel-dressing, keep work from rusting, and keep solutions free of foul odors. It is also said to exhibit the lubricating and anti-weld properties of sulfurized oils without smoke, odor, dermatitis, or burned hands.

Swan-Finch Oil Corp., RCA Building West, New York 20, N. Y.



Universal Monochromator Covers 0.18- to 40-Micron Regions

When suitable prisms or gratings are used, Model 83 Monochromator covers the ultraviolet, visible, and infrared regions of the spectrum (0.18 microns to 40 microns). Not a complete instrument in itself, this unit is the essential part of any spectrophotometer. It is said to provide greater resolution than most standard instruments. The collimator is an 18 deg off-axis parabola of 270-mm focal length and the effective aperture of the Littrow mount is f/4.5. Prisms available are fused quartz, crystal quartz, glass, LiF, CaF_2, NaCl, KBr, and KRS-5. A 14-deg parabola can be supplied to reflect directly to the Littrow mirror.

Perkin-Elmer Corp., Glenbrook, Conn.

Oil-Hydraulic Cylinders Provide Universal Mountings

Improved cylinder-head seals, multiple piping-connection positions, universal mounting positions, special self-adjusting packings, and adjustable hydraulic cushions have been incorporated into the series LA hydraulic cylinders. They are available in 12 standard bores from 1 to 8 in. and 12 standard mounting arrangements. Most models can be equipped with standard or heavy-duty rods.

Vickers, Inc., 1410 Oakman Blvd., Detroit, Mich.

O-Ring Seals Molded to Close Dimensional Tolerances

Closer dimensional tolerances, greater uniformity of production, and lower costs are said to be possible in the manufacture of O-rings by an injection molding process. The rings are made of a synthetic rubber compound, said to have high tensile strength and high resistance to oil swelling and abrasion. These rings are reported to provide excellent service at pressures up to 10,000 psi.

Minnesota Rubber & Gasket Co., 3630-A Wooddale Ave., Minneapolis 16, Minn.

Special Drill Designed for Automotive Body Builders

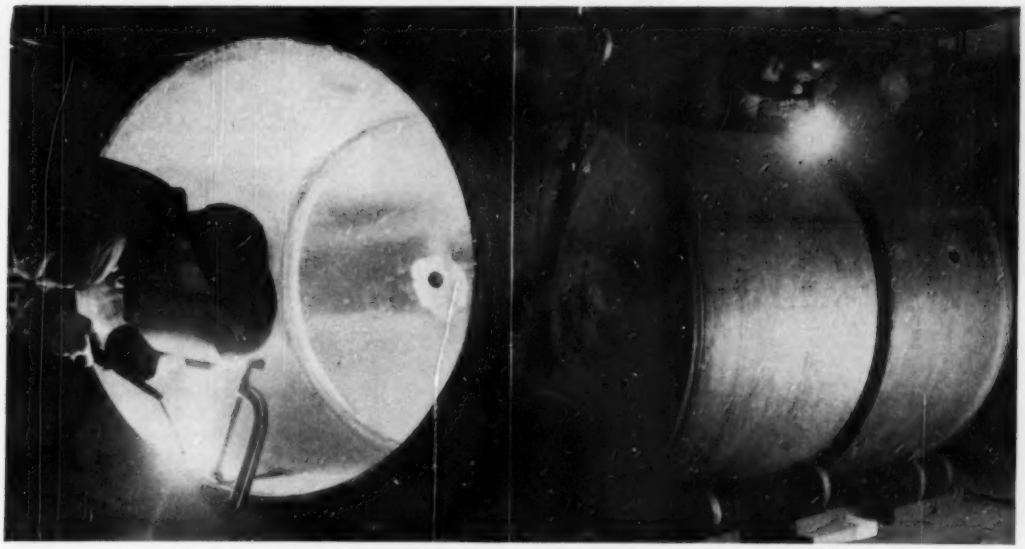
The Body Builder's Special is a drill designed for continuous day-long use under severe conditions. It weighs 4¼ lb and is 8¾ in. over-all length. Capacity is ¼ in. in metal, ½ in. in wood. No-load speed is 1300 rpm. The red-knob handle rotates in a slot in the tool and is adjustable to any position. It is loosened by a quarter turn.

Cummins Portable Tools, Div. of Cummins Business Machines Corp., 4740 Ravenswood Ave., Chicago 40, Ill.

Arc-Welding Electrode Is Reverse-Polarity Dc Rod

The W-22 electrode is designed specifically for vertical and overhead welding in mild steel. Its penetrating arc suits it for welding galvanized plate stock, and facilitates welding of lap joints and edge welds. Low-volume slag-forming characteristics of the electrode make it practical for repair welding of castings.

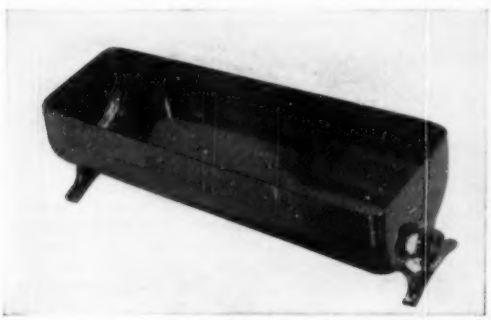
General Electric, Schenectady 5, N.Y.



Above left: Welding cylindrical tanks at S. Blickman, Inc., Weehawken, New Jersey, with new "Stainweld". Above right: Downhand welding 18-8 stainless steel 1200 gallon still.

NEW LINCOLN ELECTRODES CUT STAINLESS WELDING COSTS

All types of stainless steel pressure vessels and containers are now being weld fabricated at lower cost with new, improved Lincoln "Stainweld" electrodes. As a result of newly developed coating, new "Stainweld" offers these cost cutting advantages:



Stainless steel trough shows high quality welds ground and polished. Courtesy S. Blickman, Inc.

- **Welds easier in flat, vertical and horizontal positions.**
- **Arc is more stable... simplifies welding in corners.**
- **Restriking is easier.**
- **Spatter is less... slag removal is better.**
- **Welds are more solid... greater freedom from pin holes.**
- **Bead surface is more uniform... needs less finishing.**

GET THE FACTS

Send for free Lincoln Weldirectory for Stainless Steel.

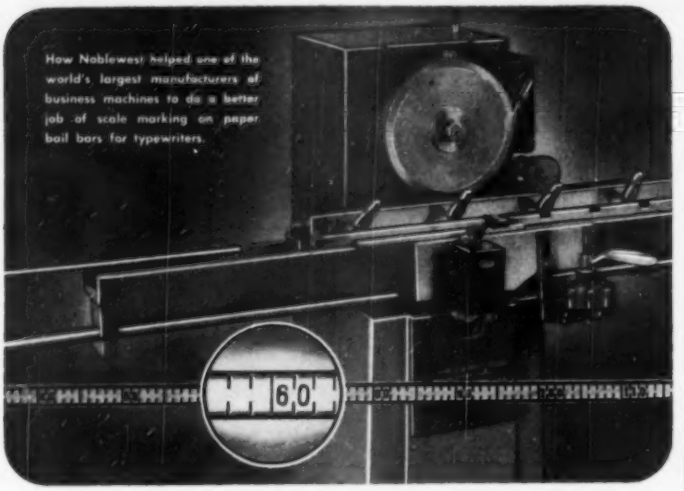
THE LINCOLN ELECTRIC COMPANY

Dept. 102, Cleveland 1, Ohio

Sales Offices and Field Service Shops in All Principal Cities

LINCOLN

LEADERS IN INDUSTRY MARK WITH NOBLEWEST

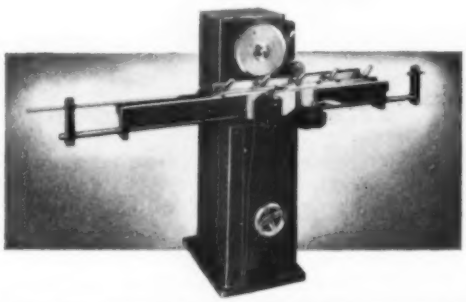

How Noblewest helped one of the world's largest manufacturers of business machines to do a better job of scale marking on paper bail bars for typewriters.
HH 6.0

PRODUCTION GRADUATING

at 300 linear inches per minute

THIS Noblewest precision graduating equipment roll-marks graduations into bar stock in lengths up to 3 feet at the high production rate of 300 linear inches per minute . . . does it better . . . and at lower cost than methods previously used. It is another example of how Noblewest Modern Marking Methods result in savings that often pay for the equipment within a year or less.

Although developed especially for rolling graduations and numbers permanently into typewriter paper bail bars, it can be used for similar marking on any other type of metal bar stock or other materials including plastics, wood, hard rubber, etc. It employs the famous Noblewest roll marking process, where marking is accomplished by single-point contact between the roll marking die and the work piece. Relatively low pressure produces minimum strain and negligible distortion. Pneumatic Pressure Compensator controls depth of inscription as well as compensates for slight variations in stock thicknesses or surface irregularities. The precision graduating die is motor driven and interchangeable. For information on how to mark your products faster, better, at lower cost, write the Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.



Model No. 306

MARK IT BEST WITH NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

ROUND TABLE Discussion

THE FIFTH WHEEL

The foreman, assuming he is of bona-fide quality, is naturally the one who is most able to detect the pressing need of equipment replacement. The boss who knows his "stuff" will be able to spot causes of production leaks. His views should certainly carry weight when he has the chance to express them.

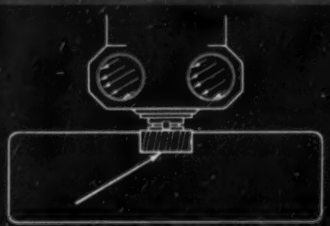
Recommendations for new equipment calls for sound reasons why the investment should be made. The greatest factor to be taken into consideration is that of manhour cost—nothing to be sneezed at in this day and age. Poor equipment is a form of plant sickness and needs the services of a competent physician—a machinery doctor, as it were. Whether this aid comes in the form of a "commission," comprised of broad-minded members of the firm, or an outside authority such as a reputable industrial engineer, the fact remains that someone must set the ball in motion that the foreman has started.

There is no need to decrease the value of the dollar, in a way, by continuing to use a piece of machinery which is obviously, from the foreman's viewpoint, incapable of producing its just share of useful work. I like the idea of augmenting the services of the plant commission with an outside trouble-shooter whose expert knowledge gained by wide experience in the production field places him in an enviable position of sound judgment.

Following the foreman's recommendation, it is the industrial engineer who applies the proper opiates to allay the costly pains of inefficient output. Often it will be found that the "head man" in a small establishment is one who has risen from the ranks and in sitting in judgment cooperates fully with the foreman in whom he has explicit trust.

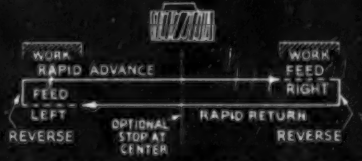
The effectiveness of a foreman's recommendations is dependent upon the ability of the man above him to see the larger vision. Ofttimes it so happens that the foreman's efforts are thwarted by the one above who, through lack of experience and foresight, fails to grasp the true significance of his recommendations. I have seen the shop boss aetherized so completely by the big shot's suave syllogistics that he threw up his hands and said: "Ah, ta hell with it—forget it." Needless to say he left the office and returned to the shop

KENT-OWENS *Plus Features* Give You PLUS PRODUCTION!



TWIN POST HEAD MOUNTING

Head mounted on two cylindrical ground steel posts which carry spindle midway between them—an *exclusive Kent-Owens feature!* No overhang.



WIDE RANGE OF AUTOMATIC CYCLES

Hydraulic feed used on all Kent-Owens power feed machines. Wide range of automatic cycles available including intermittent milling, etc. Independent feed rate for both directions of table travel permits doing entirely different operations at opposite ends of table.

You'll find Kent-Owens Milling Machines the cost-cutting answer to a wide range of milling jobs! They're *rugged, simple, versatile* . . . with practical features that reduce machining time . . . save labor . . . and maintain high precision. Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.

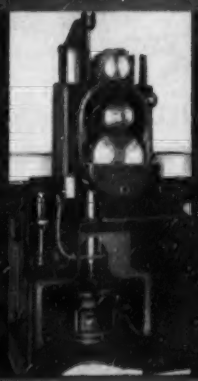
Call on

KENT-OWENS

for Milling Machines

ONLY TWO GEAR CONTACTS ...MOTOR TO CUTTER

Drive is unusually simple and direct, being taken from a standard foot mounted ball bearing motor at rear of machine. Wide range of spindle speeds by changing pick-off gears.



SEND TODAY

for

NEW

12 PAGE

BOOKLET

"How Tool Costs Were Cut 12 Ways in 20 Plants"....

FREE ON REQUEST.....

How savings start the day McCaskey Tool Crib Control is installed in a tool crib is told in the words of responsible plant executives. Here is a report of results in twenty representative plants and how they were secured, abbreviated to save your reading time.

For example, reduced purchases resulting from shrinking crib inventories and prevention of hoarding usually pay the McCaskey bill several times over. A dozen other immediate savings add up to substantially lower tool expense and improved operating efficiency.

Let us send you the booklet telling how McCaskey will help cut your tool costs, too.

FILL OUT AND MAIL COUPON TODAY!

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Send me your new booklet, "How Tool Costs Were Cut 12 Ways in 20 Plants."

Name .....

Position .....

Company .....

Address .....

AM 2-50

McCaskey

INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

where he continued to nurse along conscientiously with the piece of industrial junk, while the top hat in the front office rubbed his hands together and smiled contentedly, "Well, I put that one over."

J. Homewood
Ontario, Calif.

•

Now Al's superiors have decided to introduce an inspector at the head of production, to match the one at the tail. The thought behind this move, of course, is to insure that future setups will be started with sharpened cutters and punches, clean jigs, fixtures that will work without last-minute repairs and setups that are ready to go.

It will not work! The thought is lovely and inspiring; but the *modus operandi* is terrible. When a truck, loaded with bricks, breaks an axle on a main intersection during the morning rush—you want a repairman—and fast; not somebody to make a speech.

The idea will not work, because Stebbins, who is assigned to the spot, is a member of the inspection setup; Stebbins also is to report to the front office, and won't take orders from Al.

In the first place, inspectors do no production work. They check, and accept or reject — leaving to the shop the job of finding rejection causes and correcting them. From the very nature of his job, the inspector can't afford to become too chummy with the production foreman, for at any moment he may have to shut down a lineup, and thereby break off diplomatic relations.

A dog should wag his own tail; a foreman should have control of his own tools, jigs, fixtures, etc. If Stebbins is to act as a special inspector of tools, then he will also have to accept them for production, and, at times, reject some. Now what is always needed at the start of a new job is help to get tools sharpened, ground to size, and conditioned for the job. The foreman needs help and not criticism; an inspector, disassociated from production, is the last person to be helpful at that spot.

A good production man has one temperament, and one brand of experience; a good inspector has an entirely different temperament, and a radically different brand of experience. A front office directive will not make oil and water mix, nor will it make an able inspector into an equally able production man.

If jobs are being run without properly conditioned tools, by all means assign a trained tool-trouble man to the job of seeing that tools

An example of Salmonella Typhosa Bacteria, magnified 30,000X by Electron Microscope.

Are Bacteria Biting Into Your Profits?

When bacteria and mold attack lubricants and coolants, causing them to go sour, they result in expensive production delays and costly material wastes.

Now you can prevent these microorganisms from producing *machine down time* and wasted materials. Dowicides, Dow's industrial germicides and fungicides, incorporated in cutting, grinding, rolling and hydraulic soluble oil emulsions, will prevent the growth of bacteria and mold, thus increasing the service life of the oils. Dowicides are available in both oil and water soluble types.

Keep bacteria from biting into your profits. Learn more about Dowicides today. Complete laboratory facilities are maintained by Dow to help solve your problems. Contact your nearest sales office or write direct.

THE DOW CHEMICAL COMPANY · MIDLAND, MICHIGAN
New York • Boston • Philadelphia • Washington • Atlanta
Cleveland • Detroit • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

use the

Dowicides

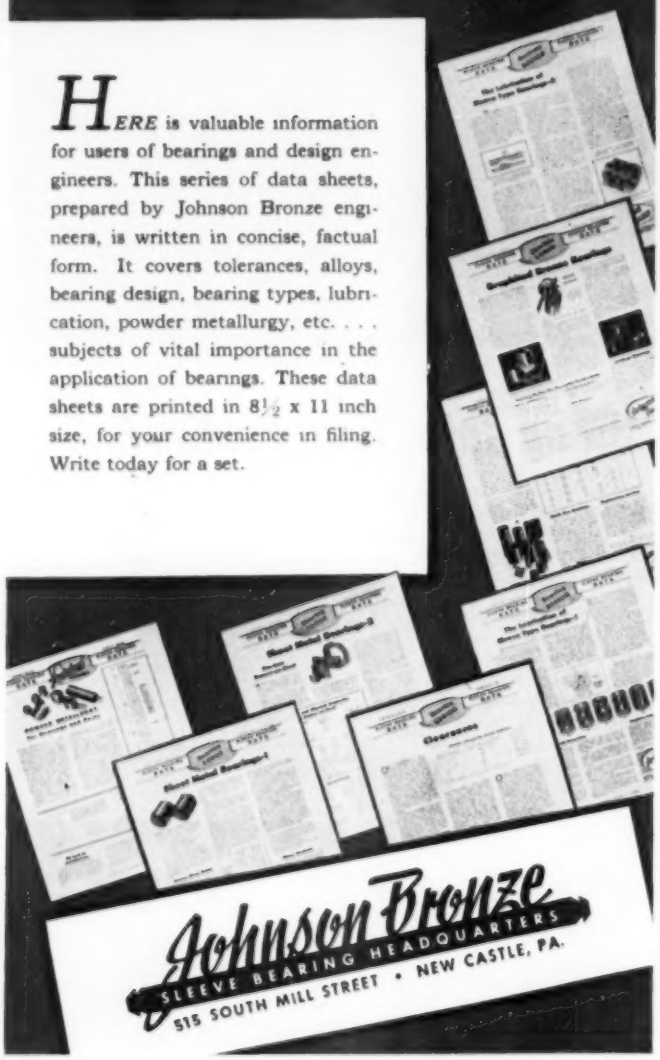
Industrial Germicides and Fungicides

DOW
CHEMICALS
INDISPENSABLE TO INDUSTRY AND AGRICULTURE

Free

facts about BEARINGS and bearing use for YOUR FILES

HERE is valuable information for users of bearings and design engineers. This series of data sheets, prepared by Johnson Bronze engineers, is written in concise, factual form. It covers tolerances, alloys, bearing design, bearing types, lubrication, powder metallurgy, etc. . . . subjects of vital importance in the application of bearings. These data sheets are printed in 8½ x 11 inch size, for your convenience in filing. Write today for a set.



Johnson Bronze

SLEEVE BEARING HEADQUARTERS

515 SOUTH MILL STREET • NEW CASTLE, PA.

are ready in advance, and that the job will click when started. Let this man report to the front office, and give him authority to overreach the foreman, if you think this is desirable. In that position he'll accomplish good, and spur Al to do better.

But don't introduce an inspector—spector of finished parts—and everybody will finish up quite unhappy.

James K. Matter
Detroit, Mich.

•

It may be true that "the squeaky wheel gets all the grease" but where no adequate inspection of equipment exists, no amount of grease will smooth the situation when the equipment goes bad. With proper separate equipment inspection service in the shop, trouble of this nature can be effectively minimized.

Putting special inspection of shop tools and equipment in the same category as a "fifth wheel" is not considering this important function in its proper light. The inspection of a product to maintain quality is only a part of a complex picture. If the manufacturing department could operate perfectly no inspection would be necessary. The purpose of inspection is not merely the rejection of bad work. An important phase deals with inspection of equipment and shop tools. Stopping trouble before it begins is the essential nature of this service.

It should be emphasized that the proper functions of inspection do not stop at inspection of raw materials, parts in process and finished goods. Provided with proper designs, materials, and facilities the manufacturing departments might be presumed to function effectively unaided by an inspection department. However, operating executives are likewise responsible for volume of output, meeting schedules, and low costs. The immediate pressure of these demands make it advisable to have a separate functional setup for inspection.

Separate inspection service serves to avoid loss of labor on parts or materials which are defective, as well as to check waste consequent upon the use of defective auxiliary equipment and tools, and thus relieve the foreman of routine duties of this nature. Experience has shown that manufacturing departments unaided by separate inspection service have difficulty in maintaining standards and quality satisfactory. Separate inspection can be considered as the price paid for quality and quantity maintenance insurance.

It is believed that separate inspection can hardly be considered as pre-

IF YOU MAKE

STAMPINGS

DIE CASTINGS

PLASTICS

You Can Save Money with H-P-Ms !

MR. METALWORKER . . . here's good news for lower production costs . . . H-P-M FASTRAVERSE presses offer you fewer rejects (less than 1% scrap loss in most cases), deeper draws (the clothes washing machine tub illustrated above was drawn in a single stroke!). With H-P-M presses, you're not confined to deep drawing stocks . . . irregular sheet can be drawn with ease. This all adds up to greater profits for you. Write for Bulletin 4706 and a copy of "Why Hydraulic Presses."

MR. DIECASTER: Die Casting is a fast, low cost casting process. H-P-M Die Casting Machines have greater injection capacity, less chance for die "spitting," quicker die set-up, full automatic control with hydraulic ejectors and core pulls. You can't beat H-P-Ms. Write for Bulletin 4803 and a copy of "Modern Die Casting Practice."

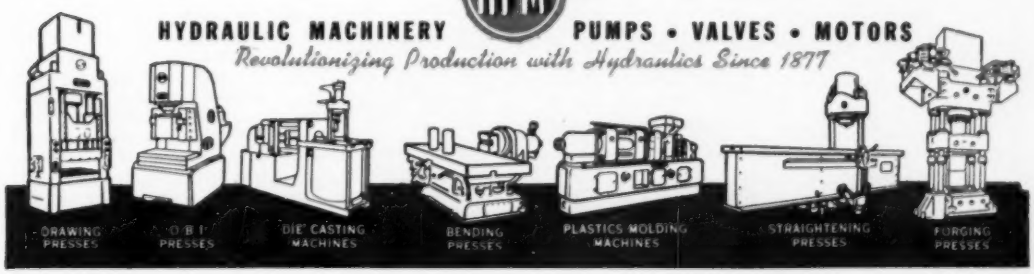
MR. PLASTICS MOLDER: Capitalize upon the plentiful supply of plastic material. H-P-M plastics molding machines have full hydraulic control which guarantees a fast cycle with minimum rejects. Die set-up is easy . . . no toggles, cams or links to adjust! Regardless of your molding job . . . injection, compression, transfer, or laminating . . . H-P-M presses are confirmed money makers! Write for Bulletins 4802, 4901 and 4404.

THE HYDRAULIC PRESS MFG. COMPANY
1002 Marion Road **Mount Gilead, Ohio, U.S.A.**

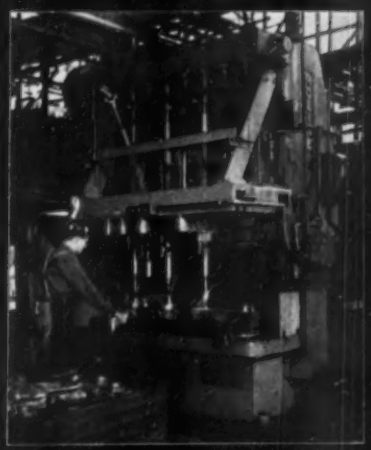
HPM

HYDRAULIC MACHINERY **PUMPS • VALVES • MOTORS**

Revolutionizing Production with Hydraulics Since 1877



For Greater PRODUCTION EFFICIENCY SAVINGS



use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

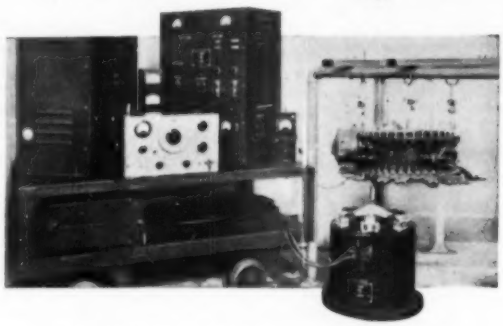
Our 50 years of Machine Tool Engineering Experience is at your service. Tell us your particular problem.

MODEL HU68 universal joint type driller performing core drilling, reaming and facing operation on forged steel parts.

MOLINE TOOL CO. Hole-Hog MOLINE, ILLINOIS

MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

YOU CAN BE SURE.. IF IT'S Westinghouse



Explore . . . Test . . . Remedy

It pays off to fatigue test materials *before* production starts. Westinghouse Type HI Vibration Fatigue Equipment, illustrated above, has been designed to supply the resonant drive force needed in fatigue testing operations. Write for complete information on this or other vibration testing equipment. Westinghouse Electric Corporation, Department E-1, 2519 Wilkens Avenue, Baltimore 3, Maryland. J-02210

Westinghouse
VIBRATION EQUIPMENT

emption of the foreman's job This inspection is usually provided to supplement the quality efforts of foremen and mechanics. It should be designed as a helpful, necessary service, not as an antagonistic force of police character.

There are shops where the foremen, under pressure for quantity and low costs, become careless of the condition of equipment and tools. In this connection, separate inspection will guard against laxity with respect to equipment or tool maintenance. Under these circumstances more rigid and intelligent control is effected, and a check is provided on foremanship by separate administration of the inspection function.

In the plant organization, inspection of the product should be but one phase of the inspection task. Separate inspection should include a checkup on the condition of machines, cutting tools, and accessory equipment such as dies, jigs and fixtures, as well as speeds and feeds. A punch press may be out of line or the tool used may be worn. Setup variations may occur; damaged jigs may affect quality.

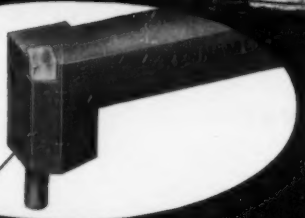
Prevention of faulty production is constructive inspection procedure. In many operations the workmen use gauges or other checks as a guide in doing work, and this equipment needs to be looked over periodically. Laxity with respect to manufacturing standards quickly manifests itself in imperfect production. As the inspector is in a position to note these defections quickly, he may greatly aid the production foreman. However, the danger in making suggestions to the foreman is that the inspector tends to assume responsibility for arrangements, and thereby for quality of output. For this reason it is believed that inspectors should be required to offer constructive criticism only in reports to the chief inspector, who should then make proper suggestions to engineering or production executives concerned. With this policy, the inspector's arbitrary, judicial attitude toward his work is not compromised. In order to insure the adequate functioning of separate inspection in the shop, management should endeavor to employ alert, energetic inspectors. These men should have the ability to perform their work without provoking the animosity of the foreman and the worker. They need to be pleasant of manner, capable of winning cooperation by suggestion, with an absolute minimum of friction. The alert inspector in the shop will come to know the men and machines intimately. With increasing ability he will not only be

If you want FREEDOM...

from Unreliable Tooling

from Cheap Money

USE



DEMAND

KENNAMETAL

GOLD COIN STANDARD

Unreliable tools—like cheap money—do not give full value, regardless of their price. The loss due to their unsoundness extends far beyond their own cost—lost man hours, excessive machine downtime, wasted materials.

Kennametal Tooling gives you:

- *FREEDOM to plan a production schedule and maintain it—getting the greatest benefits from skilled men and good machines.*
- *FREEDOM to machine iron castings having hard, burned, or sandy spots, at high speed—thus saving time and materials.*
- *FREEDOM to machine hard steel—up to 501 Brinell—at high speed, without re-annealing and heat treating.*
- *FREEDOM from experimentation—experienced Kennametal tool engineers can recommend the proper tooling for best results on your jobs.*
- *FREEDOM from guesswork—our complete and accurate Catalog makes it easy to order tools for specific jobs.*

Cheap money—like unreliable tools—does not give full value. The consequences of cheap money extend far beyond the demoralizing current effects—spiraling prices, exorbitant taxes, financial insecurity. Ultimate loss of personal liberty, and absolute abrogation of the individual's property rights are inevitable.

Cheap money is the result of the American citizen's inability to control the public purse by demanding and receiving gold in exchange for paper money. Return to the Gold Coin Standard gives you:

- *FREEDOM from excessive taxes and wild spending of your money by government.*
- *FREEDOM from unfair competition subsidized by government loans out of your tax money.*
- *FREEDOM to keep what you earn and spend it as you please.*
- *FREEDOM to save with assurance that your savings are secure.*
- *FREEDOM from economic conditions unfavorable to enterprise and initiative.*
- *FREEDOM to help check the stealthy advance of Socialism, whose deadly weapon is fiat money.*

YOU GET MORE from Less Kennametal

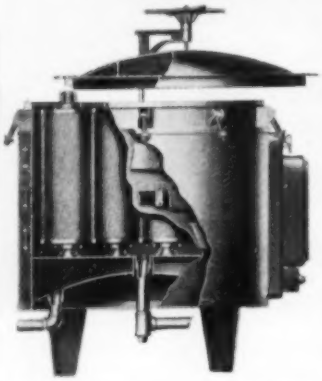
Ask our representatives to demonstrate Kennametal . . . the tooling that reduces costs and increases productivity.

YOU GET LESS from More paper money

Ask your Congressman if he is for or against the Reed Bill HR3262. You and other voters must know.

Less time for a change!

HOFFMAN Cartridge Filters



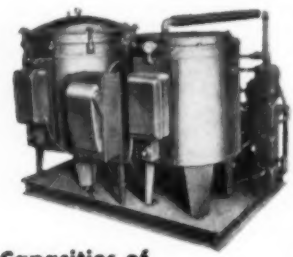
Simplify Cartridge Replacement with Exclusive Cover-Lifting Device

Along with efficient filtering at high flow rates, Hoffman Cartridge Filters provide maximum service convenience. Exclusive cover-lifting device speeds up cartridge change – either the 7 x 18 size, for Navy throw-away cartridges, or the 11 x 18, for repackable or throw-away types, offer this feature. Swing bolts fasten the cover – an additional advantage for cartridge changes.

FOR LUBRICATING, FUEL OR INDUSTRIAL OILS

Two sizes: I-718 for 7 x 18 Navy-size throw-away cartridges in multiples of 1, 2, 4, 7, 9, 14, and 18 cartridges. I-1118 series, for either repackable or throw-away cartridges, in multiples of 1, 2, 3, 4, 6, and 8 cartridges.

Write for bulletins A-703 and A-649 respectively.



Complete Recovery of Used Oil

–The HOFFMAN OIL CONDITIONER

Removes insolubles, as well as solubles, to cut new oil costs. Unit consists of Hoffman Vaporizer (to remove oil, gas, moisture and fuel dilution) . . . Cartridge Filter to remove solubles. Mounted on a common base . . . only 2 moving parts . . . no steam or water connections.

Capacities of 50 to 600 g.p.h.

Write for Bulletin A-667 and A-668

FILTRATION DIVISION — U.S. HOFFMAN MACHINERY CORPORATION
211 LAMSON STREET, SYRACUSE 6, N. Y.
CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO. LTD. NEWMARKET ONT.

able to recognize potential trouble and error, but will appreciate their causes and be competent to offer constructive suggestions for their elimination.

Preventing waste of labor and machine time in operation devolves in part upon the operating condition of the equipment and tools used. "A stitch in time saves nine" may well serve as a fitting motto for the constructive value of a separate inspection service. It certainly is a step in the right direction to relieve the production foreman of the routine duty of equipment inspection so that he may devote his time and efforts to the more detailed problems of production, costs, and shop administration.

Harry Kaufman
Philadelphia

"Nothing, thank you—just looking."

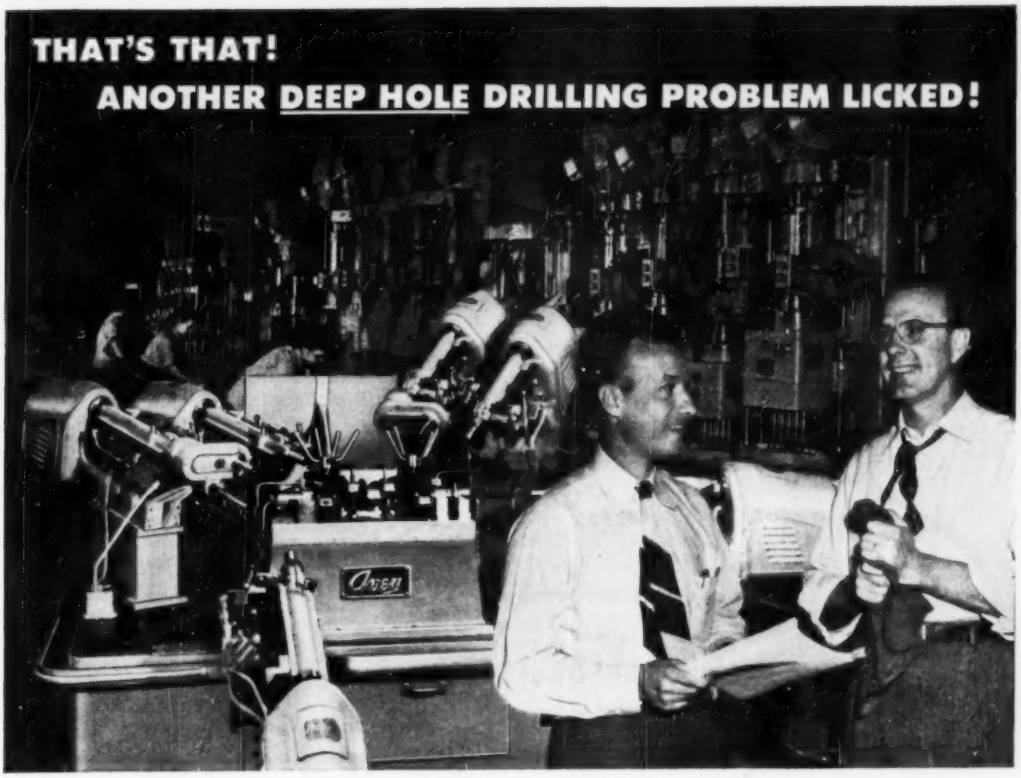
Unforeseen events need not change and shape the course of a shop's operation if adequate inspection of equipment as well as product exists.

If you have ever been in a position where an important piece of equipment, because of a neglect of adequate inspection, fails at a time when it is usually urgently and critically needed, you can appreciate that feeling of being as helpless as a man when the drawstring of his pajamas snaps inside the hem. In many instances machines do not advertise their nearness to breakdown and their need for overhaul and repair.

Another reason for subdivision may be where the department grows and becomes too large to be housed in its present quarters and must seek additional room.

These changes are only growing pains which are necessary for a healthy condition and should not cause any break in friendship or loss

THAT'S THAT!
ANOTHER DEEP HOLE DRILLING PROBLEM LICKED!



I'll never forget that day! We had four angular oil holes plus end drilling operations on that crank. And we'd tried all kinds of step drilling units. Best we could do was eleven cranks an hour . . . and we were knee-deep in snapped drills most of the time.

Then somebody got wise and checked into Avey's deep-hole drilling unit, the *Avey-Draulic*. We sent 'em the specs, and asked 'em what they thought they could do. Boy, they told us! And, then, here it came—that special machine right there.

Well, we ran off one lot of cranks, and checked. Couldn't believe my eyes! The drills were almost like new. We tried a production run-off, and Charley (he's our Production Chief) darned near fainted. Seventeen finished cranks an hour . . . with feeds and speeds at a maximum.

You needn't sell us on *Avey-Draulic* Units for deep hole drilling jobs . . . we're sold!

The above story is typical of the many plants where the Avey-Draulic is making new records in deep hole drilling. Ask us about it. Write for Engineering Bulletin 302.

Avey

DRILLING MACHINE COMPANY, CINCINNATI 1, OHIO

DRILLING AND TAPPING UNITS
AUTOMATIC INDEX TABLES
DEEP HOLE DRILLING MACHINES
SPECIAL DRILLING AND TAPPING MACHINES

A dollar spent with Avey buys a dollar's worth of service, too!

THE BEST AGENTS EVERYWHERE SELL . . . AVEY

buying alloys?

only at Ryerson do you get these three:

1 *Stocks of selected quality*

2 *Test-proven performance*

3 *A guide to heat treatment*

...yet Ryerson gives you this three-way guarantee of satisfaction at no additional cost. So contact the Ryerson plant nearest you for any alloy steel requirement.

OTHER RYERSON PRODUCTS

Bars—Stainless, hot rolled and cold finished carbon steel, reinforcing

Structurals—I Beams, H Beams, channels, angles, etc.

Plates—Sheared and U. M., Inland 4-Way Floor Plate

Sheets—Hot and cold rolled, many types and coatings

Tubing—Seamless and welded mechanical and boiler tubes

Stainless—Allegheny metal bars, sheets, plates, tubes, etc.

Machinery & Tools—For metal fabrication

RYERSON STEEL

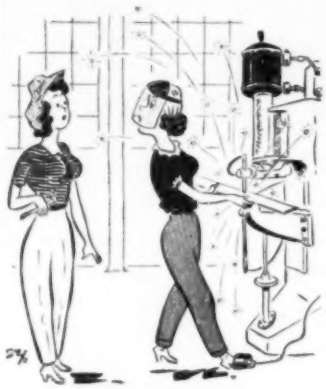
JOSEPH T. RYERSON & SON, INC. PLANTS: NEW YORK, BOSTON, PHILADELPHIA, DETROIT, CINCINNATI, CLEVELAND, PITTSBURGH, BUFFALO, CHICAGO, MILWAUKEE, ST. LOUIS, LOS ANGELES, SAN FRANCISCO

to any individual, and also be a means by which each individual can be placed where his efforts may count for most.

Then, too, sometimes a man comes up in the ranks with exceptional ability who is deserving of having a place where his ability can be used to the best advantage. To give him his just dues, it becomes necessary to place him in another man's place. From a purely business standpoint, the manager sees it the only logical thing to do, even though the man who is displaced feels hurt. However, he can hardly expect the organization to not recognize such talent. Something soothing can usually be done for him, perhaps in another department.

Such matters are comparable to a race; while the loser regrets that he must take second place, there is nothing else left for him to do and the more gracefully that he does it the better it is for his reputation, as all winners must eventually either give up first place or retire from the business.

John Mark May
Watervliet, N.Y.



"I gotta go see a doctor . . . I keep seeing spots before my eyes!"

Al's reasoning on a man to inspect machines, tools, jigs, dies and like equipment is OK.

It is in agreement with systems in force in some shops now. I have seen it carried on by the toolcrib man, personnel depts, and other individuals. In several large shops it seems to be a perfect setup under personnel supervision. In these places first aid comes under their head. So for safety purposes it is in good hands. In one of these big plants the new employee is given a printed form of instructions.

That includes a warning to tell the

How Fafnir helps manufacturers

increase the "abuse capacity"

of portable electric tools

Out where men are men and no refreshing coolant flows, portable electric tools show the stuff they're made of. And the job they do miles from a maintenance staff, down the tracks, out on the farm, on the building site and down in the earth proves that manufacturers put plenty of "stuff" in electric tools . . . sturdily built motors, tempered steel gears and shafts, shock-resisting housings and the best ball bearings to transmit the full power of the motor to the spindle. The fact that so many leading manufacturers of electric tools use Fafnir Ball Bearings proves how well Fafnir has worked with these manufacturers in solving their special problems.

Protection of ball bearings from contaminants has been a major Fafnir project. Some of the types most commonly used in electric tools are the felt seal, the Mechani-Seal and the Plya-Seal.

Whatever your specifications for ball bearings, Fafnir can meet them more precisely, simply because Fafnir's experience is not limited to just one or two industries but is industry-wide. The Fafnir Bearing Co., New Britain, Conn.

Fafnir Felt-Seal Ball Bearing has a cartridge type seal, consisting of two metal plates enclosing a felt washer.

Fafnir Mechani-Seal Ball Bearing has a labyrinth seal, to retain grease and lock out dirt. Outer member acts as slinger.

Fafnir Plya-Seal Ball Bearing uses a flexible synthetic washer held in place by stainless steel split retaining ring.

FAFNIR
BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

OLIVER OF ADRIAN

OLIVER ACE

CUTTER GRINDERS

PAY OFF

HEAVY DUTY MODEL

Oliver Ace Grinders pay off handsomely in any tool room operation. Cost minded tool buyers have long recognized the efficiency of the Ace Cutter Grinder and know The Ace to be a dependable producer of *accurate* and *finely* finished work.

CHECK THESE ACE FEATURES · Quick and easy set-ups · accommodates large range of cutting tools · more versatile · less operator's fatigue · full view operation · clearances instantly obtainable · fixed diamond compensates for wheel wear.

TWO MODELS · The Oliver Heavy Duty Ace Cutter Grinder is designed for clearing, gumming and finish grinding High Speed, Stellite and Tungsten-Carbide Cutters to required accuracy.

· The Standard Oliver Ace Cutter Grinder is designed for lighter tool room work.

Write today for complete information. Let us show you how Ace Cutter Grinders can produce more and finer work in your tool room at less cost.

AUTOMATIC DRILL GRINDERS · TOOL & CUTTER GRINDERS—DRILL POINT THINNERS—TEMPLATE TOOL GRINDERS—FACE MILL GRINDERS—DIEMAKING MACHINES

OLIVER INSTRUMENT CO.

1414 E. MAUMEE • ADRIAN, MICHIGAN

personnel department if a tool or machine is performing unsatisfactorily.

This is good practice if your shop is large, because in Ed's place he might be too busy to give attention to something he may not regard as urgent. Before Ed really gets to it we may have an accident causing injury to an employee or a serious breakdown on a tool or machine, that a man giving these things special attention may have caught in time.

In one place after the specialist or inspector investigated, he reported to a committee composed of a man in Ed's official capacity, the manager and the personnel man. Their findings went to the main office if it concerned need of a new machine.

If a new design tool or jig was under discussion the committee was augmented by the head of the engineering dept. Now this is big shop management talk and the system was necessary and a success from many angles. It relieves a man in Ed's place of considerable responsibility, and tends to bring in several heads to settle a question, which under most circumstances are considered better than one. Sometimes this same Ed may not be taken as serious as should be in the main office. So your committee as a body overcomes the possibility of the prejudice in the office against one man's opinion.

If Ed can't take this then he is in the small one-man shop class and should get out. I take it, as you put the question, the shop where Ed is has expanded and the relieving him of this responsibility has been necessary. I recollect an Ed in charge of a large press room given such an assistant. This Ed promptly walked out, as he considered it was an attempt to undermine him. The company, much to our surprise, let him go home. In a few days the manager called on him and induced him to return and try the new system out for one month.

They got along fine without any friction. Things proved out that Ed got jealous over nothing and just lost his head. In a small shop we find many instances where the system may be cumbersome and our Ed will get along fine managing and having his say to the office on such matters. In that case Ed has his place and that's where he belongs. Not in today's big shops.

Henry Rasmussen
Niagara Falls, N. Y.

•

A broadminded, up-to-date foreman keeping up on his toes will have his machines and equipment up to par;

NO MORE HEADACHES IN HYDRAULICS

...thanks to LAPOINTE ENGINEERING

In the past, have you been plagued by down time and maintenance troubles? Have you had leakage, vibration, noise? Have you been worried about overload? *You bet you have!*

Today, conditions are different! Lapointe engineers have brought these problems under control.

LAPOINTE BROACHING MACHINES

with the new

LOW PRESSURE HYDRAULIC SYSTEM

bring smoother, quieter, cooler operation and eliminate high pressure shock and vibration. An overload safety factor as high as 66% assures ample protection under emergency or other unusual requirements in broaching — such as dull tools, variations in material, or amount of stock removed.

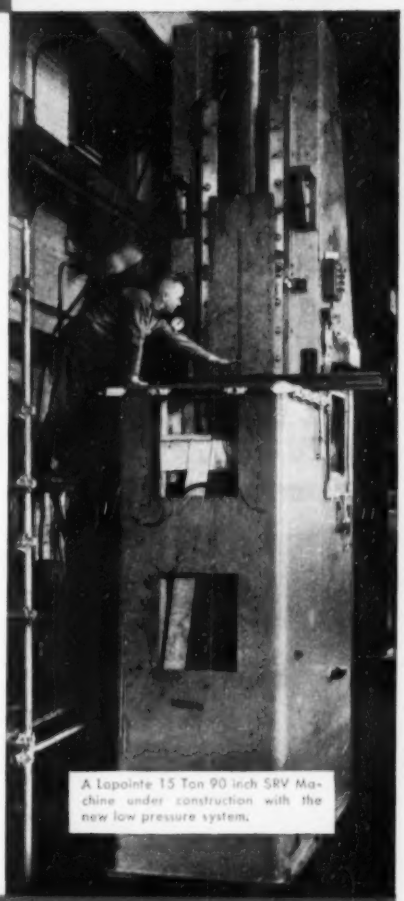
NO LEAKAGE

NO MAINTENANCE PROBLEMS

NO VIBRATION

NO WORRY ABOUT OVERLOAD

A sealed reservoir keeps the oil clean, keeps valves operating perfectly, **regardless of local conditions.** Reservoir capacity is sufficient to maintain the temperature of the hydraulic oil at the point of greatest efficiency.



A Lapointe 15 Ton 90 inch SRV Machine under construction with the new low pressure system.

Visit our new CHICAGO OFFICE
2400 West Madison St., Chicago 12
Telephone Haymarket 1-5693

Ask for our Bulletin SRV-2

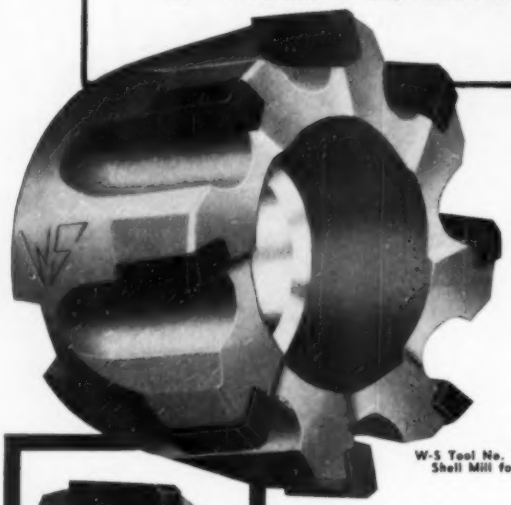
THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

REMOVE UP TO
60 CUBIC INCHES
OF STOCK PER MINUTE



W-S Tool No. "BSSM" Eight-Tooth Shell Mill for machining steel.

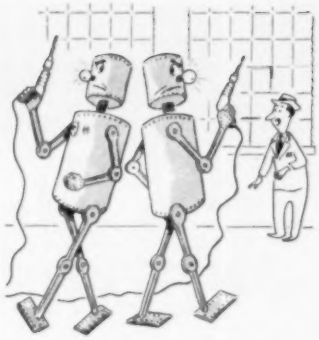
Carbide insert over-hang prevents diamond wheel from touching steel body when cutter is sharpened.

New
SHELL MILLS
BY WENDT-SONIS

Make way for faster cutting action with new W-S Shell End Mills, specifically designed for machining all types of steel, cast iron and non-ferrous metals, with stock removal up to 60 cubic inches per minute. These superior shell mills operate at much higher feeds and speeds than previous types of shell mills. More teeth in the cutters mean increased table feet per minute . . . more pieces per hour at less grinding cost and down time. Vibration-free operation. Available in a wide range of sizes from 1¼" to 6", with from 2 to 14 teeth.

FREE! W-S SPEED AND FEED CALCULATOR
Quickly figures feed and speeds on reaming and other operations. Write WENDT-SONIS Company, Hannibal, Missouri.

WENDT SONIS
CARBIDE TIPPED CUTTING TOOLS
BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS • CUT-OFF TOOLS
DRILLS • END MILLS • FLY CUTTERS • TOOL BITS • MILLING CUTTERS • REAMERS
ROLLER TURNING TOOLS • SPECIAL BITS



that is, as good or better grade than the quality of the product and therefore need have no fear whatever of having his job pre-empted.

But if a foreman does not maintain par accuracy and is continuing on luck, and ignores suggestions and oral grievances by operators, then the "fifth wheel" will help the plant in quality of products and happier working conditions for the operators.

As a toolroom example: a small drillpress is the most used, abused and ignored (as to maintenance) machine in the shop, yet dowelling of component parts can be performed very quickly and cheaply if the spindle is true and square with the table. But if the machine is below par in accuracy, then a much more expensive machine must be used, such as jig-borer or vertical-spindle miller. This is a clear case where a "fifth wheel" would benefit the company and justify the appointment unless the foreman is on his toes.

John P. Podlecki
Kitchener, Ont.

•

SUBORDINATE DICTATOR

Sometimes I wonder how this Al guy holds that job as long as he does when he continually seems to be looking for trouble and is always suspicious of the other fellow.

Morrison was hired to keep the plant equipment in top condition and must have had the required qualifications for the job to be able to land the position. From some of the results of work he has turned out, there is evidence of his ability and sincerity, so why should his decision be doubted. It isn't a case of being dictated to, as I see it, but merely allowing the man to do his job. Al claims that the man is looking for trouble by reporting a possible breakdown before it occurs. The old saying about locking the barn doors is still darn good, and if

Superhoned I.D.'s of UNIVERSAL DRILL BUSHINGS save you money on close work

Superhoning makes the I.D.'s of Universal Standard Drill Bushings *extremely fine finished, extremely accurate.* This means longer bushing life for close work, as in reaming holes to ten-thousandths limits. Although the tool is guided accurately and rigidly, *it operates freely in the bushing with minimum wear,* which assures long bushing life. Available in standard and special types and sizes. For prompt delivery and for complete information on any tools in the complete Universal line, address, the Universal warehouse nearest you—1060 Broad St., Newark, N. J. or 5035 Sixth Ave., Kenosha, Wisc. —or write direct to our home office.

EXPEDITE YOUR ORDER BY TELETYPE SERVICE.

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND EFFICIENCY IN YOUR PLANT

UNIVERSAL ENGINEERING COMPANY • FRANKENMUTH 1, MICHIGAN

It No Longer Requires a Calculating Machine and Two Small Boys to Figure Abrasive Prices!

Buyers of surface-coated abrasives will enjoy this *Simplified Pricing* by Michigan ABRASIVE CO.

- ABRASIVE BELTS
- ABRASIVE ROLLS
- ABRASIVE DISCS
- ABRASIVE SHEETS
- LAPPING COMPOUNDS

Those of you who have "sweat it out" figuring chain discounts on surface-coated abrasives will enjoy the simplified pricing provided by the Michigan Abrasive Company. It makes the figuring of costs simple, easy and time saving. It makes it easier to buy.

This convenient step in pricing from the customer standpoint exemplifies the progressiveness of this comparatively new company (8 years), where you'll find advance manufacturing methods turning out quality products.

Today many of the largest companies in the automotive and industrial field are users of Michigan Red Coat Brand Abrasives. You'll find that these sharp-cutting, long-lived abrasives can turn out the work and give you the "mileage" that reduces production costs.

But to prove this important point, send for a simplified price list and specify Michigan Red Coat Brand Abrasives the next time you order from your distributors.

Simplified ABRASIVE PRICE LIST Is Yours for the Asking
Ask Your Distributor or Write Direct

SOLD THROUGH DISTRIBUTORS

Michigan
RED COAT BRAND
ABRASIVES

MICHIGAN ABRASIVE COMPANY, 2360 W. Jefferson Ave., Detroit 16, Michigan

repairs can be anticipated and the time planned for such needed repairs, less time will be lost and better work accomplished.

I like this foreman. He seems to understand his men and to consider them part of the wheels that make industry turn. This is my way of thinking too. Let the man hired for a job do it and then see that he gets the deserved credit. In a short time the men respect this treatment and will go a long ways for the man at the helm. There are, I will admit, some workers who would rather spend their time at tasks that are time-consumers and hold up the line of moving parts but it doesn't take an experienced man very long to detect this and to make the proper corrections.

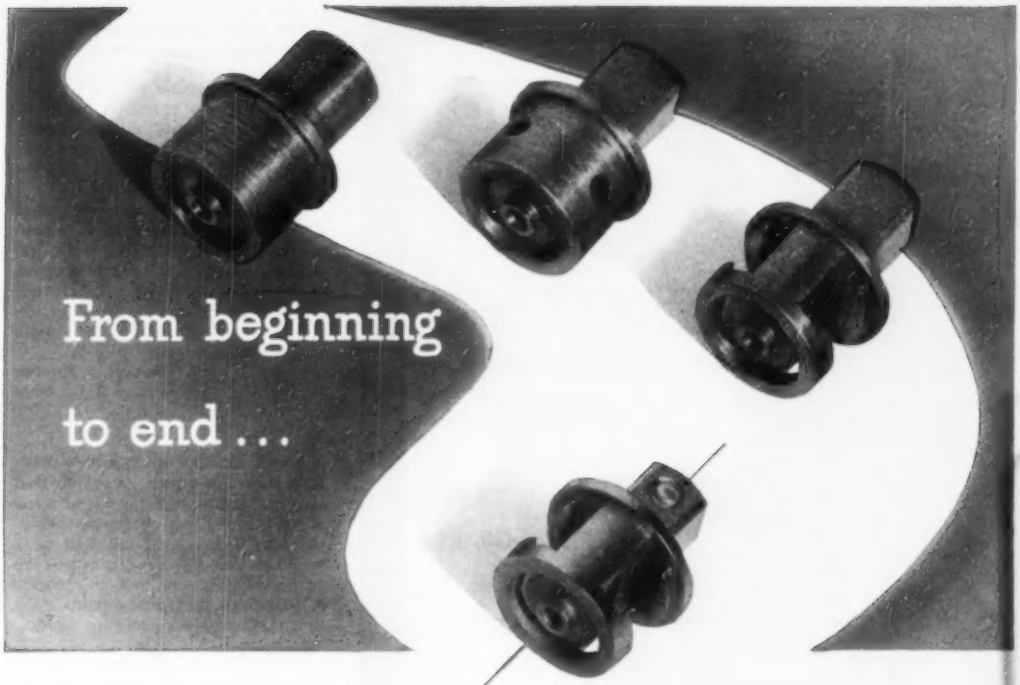
Jack Bell
Bakersfield, Calif.

•

The title of "Subordinate Dictator" which was conferred on Morrison by Al is in my opinion very much undeserved. When a man is given the responsibility, as Morrison was, to maintain a group of machines in good repairs, he must also be given the right to decide how that work is to be performed. Otherwise he should not be criticized if the work is not satisfactory. A man can hardly be called a "dictator" when he tells his superior that a machine must be repaired in a certain way.

The head of a large business or corporation surely is not expected to perform all the functions involved in operating the business. He has a staff of assistants, each of whom is an expert in his line of work, each being delegated certain responsibilities and duties and reporting to one head who in turn co-ordinates and organizes the functions of the group to produce the best results.

The foreman, by the same token, is the head of his department and must operate along similar lines to produce results. He has many duties, some of which can well be delegated to others. He is responsible for controlling the cost of products produced in his department, maintaining discipline, keeping various records, and must be a good handler of men so that he can get people of various temperaments and training to work together and produce satisfactorily. He must be ever on the alert to keep his department a safe place to work, watch completion dates of work going through his department as they affect production schedules, often be an advisor, an estimator, timekeeper, in many cases



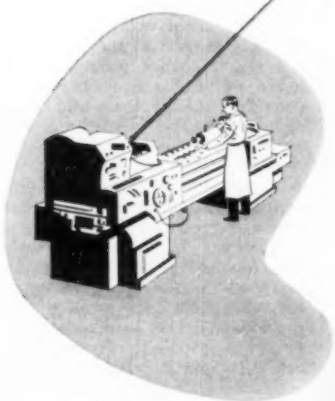
A STORY OF ALLOY STEEL BAR MACHINABILITY

Strength . . . toughness . . . hardenability . . . MACHINABILITY . . . *all* are important requirements in the material used for these quality socket wrench parts. And that's why they're made of Republic Cold Drawn Alloy Steel Bars.

In cold drawn bar form, Republic Alloy Steels give you every characteristic needed to produce high quality steel parts at lowest possible unit cost —*close tolerance, accuracy of section, fine surface and UNIFORM MACHINABILITY.*

Republic Cold Drawn Alloy Steel Bars are available in all popular analyses, in standard shapes and sizes, and furnace treated (annealed, normalized, spheroidized, stress relieved or carbon corrected) to your requirements. Republic's veteran metallurgists and machining experts are ready to work with you at any time.

Write, wire or phone *today.*



REPUBLIC STEEL CORPORATION

Alloy Steel Division • Massillon, Ohio

GENERAL OFFICES • CLEVELAND 1, OHIO

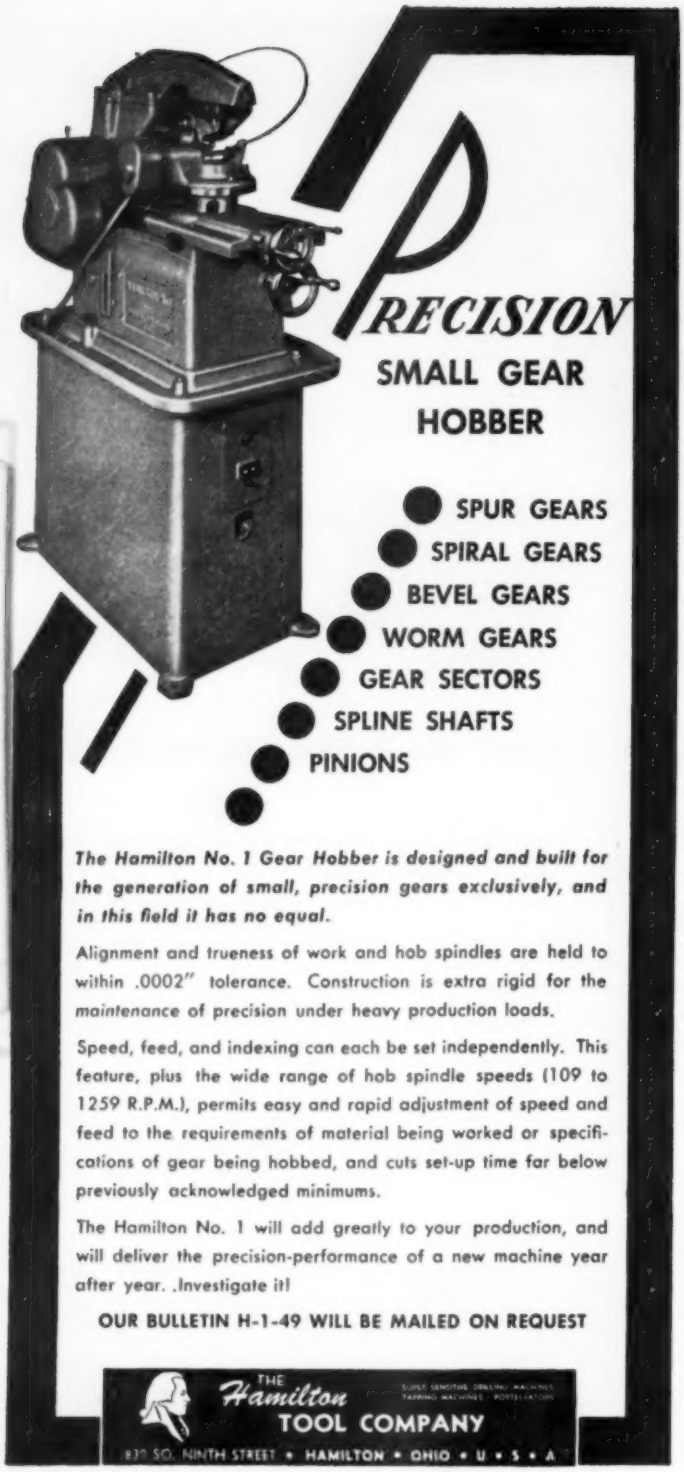
Export Department: Chrysler Building, New York 17, N.Y.

Republic COLD DRAWN

REPUBLIC STEEL

ALLOY STEEL BARS

Other Republic Products include Carbon and Stainless Steels—Sheets, Strip, Plates, Pipe, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing


PRECISION
SMALL GEAR
HOBBER
SPUR GEARS
SPIRAL GEARS
BEVEL GEARS
WORM GEARS
GEAR SECTORS
SPLINE SHAFTS
PINIONS
The Hamilton No. 1 Gear Hobber is designed and built for the generation of small, precision gears exclusively, and in this field it has no equal.
Alignment and trueness of work and hob spindles are held to within .0002" tolerance. Construction is extra rigid for the maintenance of precision under heavy production loads.
Speed, feed, and indexing can each be set independently. This feature, plus the wide range of hob spindle speeds (109 to 1259 R.P.M.), permits easy and rapid adjustment of speed and feed to the requirements of material being worked or specifications of gear being hobbed, and cuts set-up time far below previously acknowledged minimums.
The Hamilton No. 1 will add greatly to your production, and will deliver the precision-performance of a new machine year after year. Investigate it!
OUR BULLETIN H-1-49 WILL BE MAILED ON REQUEST
THE Hamilton TOOL COMPANY
830 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

a designer in the event the original design fails to function properly or produce the expected results.

The checking of a lathe, or for that matter any machine, die, or production fixture, can be rather involved. It may require many hours of checking and testing to determine accurately just what repairs and replacements are needed.

Therefore, if a foreman has a man who is qualified by training to relieve him of some of this detail work, the least he can do is to back him up on his decision, providing they are not too much out of line, even at the expense of some criticism from some well-meaning friend.

Robert T. Knotek
University Hgts., Ohio

•

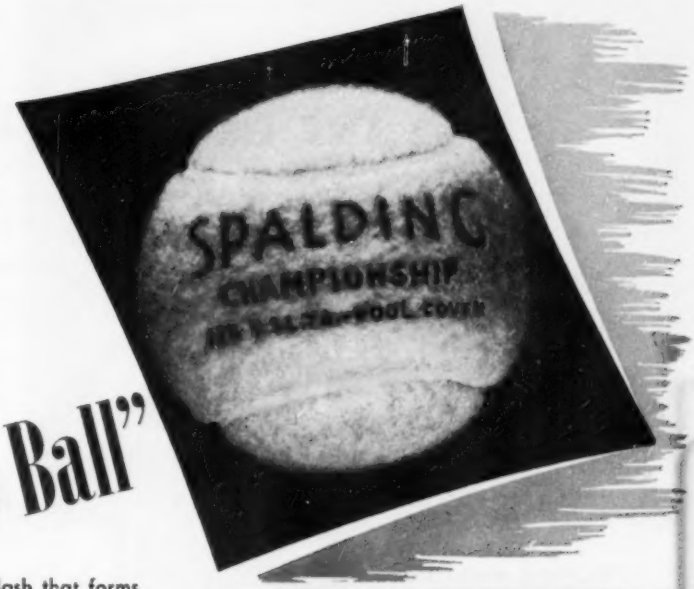
A stitch in time saves nine—that's how the saying goes. Any job that is worth while doing is worth doing right, especially on wornout machinery. To do a quick job will be a waste of time, for as soon as you try to do a production job and give it a little push the machine may break down. Then where is your production setup?

If you have a good man that knows his job and operating a machine and he is capable of doing a good job, then let him go to it. It is false economy to work with worn-out machinery. You don't know when it will break down and you have a lot of scrap, because you can't keep sizes. You must have an A-1 mechanic to nurse the machine along. Every manufacturing place should have a depreciation fund for their machines that they could renew them every 10 years as soon as they are worn. It is OK to have a machine over 10 years old if you don't use it, but even then the machines of 10 years ago are the same as the automobile of 10 years ago—out of date.

As far as having a subordinate dictate what is to be done it is OK, providing, as I said before, if the man knows his job and insists on doing a good job. In meantime I would have another man or men trained to know as much as Morrison knows his job. I personally would know as much as Morrison knows or more so I would not have to rely completely on Morrison's judgments. I would check to see if it is necessary to do as he wants and then I would assign men to help him and leave him alone to do a good job. I'd show my appreciation for a good job done. A pat on the back is encouraging to any man. I would give him full responsibility for seeing that machinery is kept in good order, but before he

Seventh in a series of Unusual Grinding Wheel Operations

"Grinding Wheel Serves Tennis Ball"



The problem of removing flash that forms in molding tennis balls is solved by the use of grinding wheels.

This unusual operation may not be suited to your particular requirements but, WHATEVER your grinding problems may be, BAY STATE can help you solve them . . . fast. Possibly the exact specifications you require can be supplied directly from large stocks either in Westboro, branch warehouses, or from our distributors strategically located throughout the United States.

Send us your grinding problems. We can help you.

Photograph Courtesy of A. G. Spalding & Bros., Inc.

BAY STATE ABRASIVE PRODUCTS CO.
Westboro, Massachusetts, U. S. A.

Branch Offices and Warehouses
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities

BAY STATE®

MEMBER OF THE GRINDING WHEEL INSTITUTE

Top Performance Consistently Duplicated

Fills long awaited need for medium weight Drill Press

Sensitive drilling machine with 25" swing for high speed production, yet suitable for maintenance work. Variable speed drive—select exact speed for any size drill from 1/8" to 1"—self-locking, convenient speed control—no belts to change—tachometer provides accurate reading of spindle speeds. Powered with 1½ H.P. motor. Five spindle speed options, each with a 4 to 1 range from a low of 206–825 R.P.M., to a high of 540–2160 R.P.M., with 3 phase 60 cycle motor. Oil groove table accuracy maintained to .0007" in 6 inches—maximum spindle travel 8". Splined spindle and driving sleeve are ball bearing equipped for free floating action. Alloy steel spindle and quill precision machined and ground. Column diameter 4½". Machine weight 765 lbs. Chart shows proper speeds for different drill sizes.

Write for Catalog No. 69

Sibley Model E-25. Coolant pump is the only extra.

SIBLEY
MACHINE & FOUNDRY CORP.
22 EAST TUTT STREET
SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
22 East Tutt St., South Bend 23, Indiana
Send Catalog No. 69, Free!

Name _____ Title _____
Company _____
Address _____
City _____ State _____

could do any major repairs he would have to consult me first for my final discussion that it would not be any trouble and whether the management has old machines that cannot be taken out of service for a major repair because of an order coming in.

That the big boss does not know in what shape his machinery is, I would say it is the fault of the foreman, and if the big boss does know the worn shape of his machinery, there is only one thing to do: Have the machinery exchanged for a new one. Then you will not be afraid of a break down in the midst of a production job. The work and new machines would be better and quicker, which would pay for the new machine in time.

Michael Axler
New York

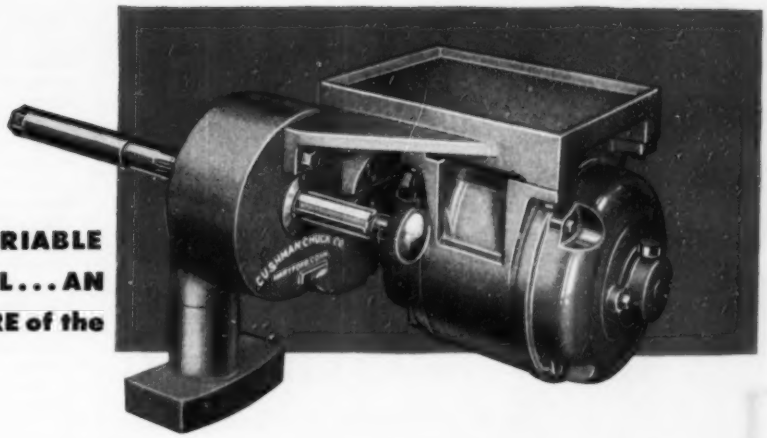
•

This phase of a busy executive's job in re machine repair or maintenance is generally handled more satisfactorily by a subordinate. The executive quite often is too busy to size up the situation correctly. He, like Al, has a job always on hand and can't wait to have repairs made until the machine fails entirely.

Quite often it's not his fault but is due to pressure of matters from big brass over him. The subordinate in reality is closer to the men who must gripe over such matters to get things attended to. The subordinate is held responsible for production cost—more so in many instances than the executive.

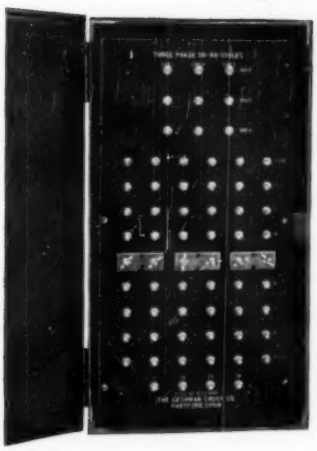
In some cases he is the goat that takes the blame. Too often he is the man that this writer has seen have to put on his hat and coat and take a long walk. This subordinate is more so a trouble shooter that can see the bugs that a machine develops and therefore he must have power to eliminate them. He is a great asset to the larger shops and not a liability as some may take it who reason with Al. At the end of a year's run Ed's policy will show a setup of machinery in good condition, which means less depreciation of value than we would get from Al's policy. The Als in a shop always want the machine running notwithstanding the bugs in it. They just give in for quickie touch-ups to keep the machine going. This policy often costs more during a fiscal year in time loss than the actual cost of repairs would at the time.

Fixing the machine in time as Morrison has done will not only end the trouble and expense in many cases, but will either restore production to normal or improve quality of workmanship.



"Cushmatic" VARIABLE TORQUE CONTROL... AN EXCLUSIVE FEATURE of the

CUSHMAN *Power* WRENCH



"Cushmatic" torque control box, connected to power line thru lever drum switch (or push button and line starter). Torque and inertia easily adjustable... 9 stages down to 25% of maximum... 220, 440, 550 V.

SEND FOR BULLETIN NO. 211D

The Cushman Power Wrench with its "Cushmatic" variable torque control box gives the operator a simple and highly accurate method for setting and maintaining a predetermined torque value in 9 stages from 150 to 600 ft. lbs.

Thus the wrench action is positive, safe and fast... opening and closing jaws automatically... reducing employee fatigue, speeding repetitive production with heavy chucks.

We offer as optional equipment control by means of drum switch or a heavy duty push button and reversing line starter. The machinist will need but little instruction to become thoroughly efficient in the automatically safeguarded operation of the Cushman Power Wrench.

THE CUSHMAN CHUCK COMPANY
Hartford 2, Connecticut

Consult CUSHMAN
Chucking Engineers Since 1862

BUCKEYE

Controlled Alloy
Precision Machined

BEARING BRONZE

MAINTENANCE BARS and STANDARD STOCK BEARINGS

Buckeye Quality Bronze—always available in adequate Distributor service stocks—is the consistent choice of:

PURCHASING AGENTS—because Buckeye offers 1088 Sizes of Standard Stock Phosphor Bronze Bearings; 156 Sizes in popular 13" length, Fully Machined Bars.

DESIGN ENGINEERS—Buckeye's proven experience in solving thousands of Special bearing problems provides up-to-the-minute knowledge for proper alloy and machining recommendations.

MAINTENANCE ENGINEERS—because replacement requirements are immediately met with highest quality bronze—in a wide range of sizes—to maintain trouble-free power transmission.

For Every STOCK BEARING REQUIREMENT • • • Consult the BUCKEYE Handy Pocket Size Catalog...

In the office—in the shop—Catalog No. 480, with many quick reference features, lists Buckeye's complete line of Maintenance Bars and Stock Bearings stocked by leading distributors in every important industrial area.

Write for *Your* Copy and name of your nearest Buckeye Distributor, Today!

Buckeye

BRASS AND MANUFACTURING COMPANY

BRONZESMITHS SINCE 1900

6410 HAWTHORNE AVE. CLEVELAND, OHIO

FULLY MACHINED MAINTENANCE BARS • STANDARD STOCK BEARINGS • SPECIAL BEARINGS TO MEET ANY REQUIREMENTS

This in turn proves a source of more contented help who will be liable to take more interest. It's a source of pride to the subordinate. As far as Ed is concerned he will never know how much trouble he missed by giving Morrison the right to repair machines on his own.

We have many places today that frown on any repairs to a lathe, etc., unless they just won't run. My experience in shops in a number of states is that while they will stand for repairs on a fixture, jig, die, or tool, the Als get their way with little or no repairs or overhaul of the machine itself. The result is that machinery in many shops today is in a deplorable condition. We have fought two world wars with this scrap and the period in between. It looks to me that we will have to fight the next one too on this scrap. Any machine not worth fixing up should be thrown out.

My advice is avoid any "quickie" repairs, as Al's attitude is likely to create. His attitude positively is not coordination from a productive standpoint. Make Ed's and Morrison's plan a must in every shop or re-equip it as soon as machines need repairs to any large extent. The Als in our shops have turned machinists and toolmakers gray before their time.

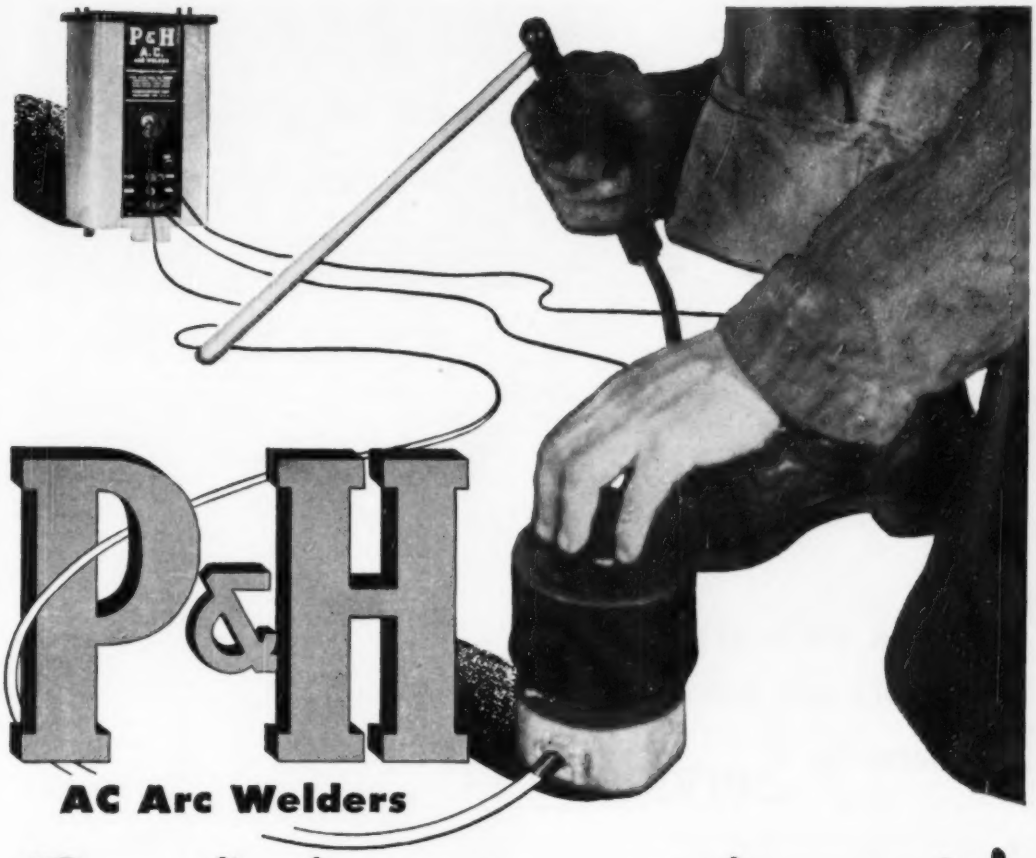
Henry Rasmussen
Niagara Falls, N. Y.

•

In the wording of this problem I can see no indication of Morrison trying to dictate to Ed Morrison has accomplished very good work in keeping these machines running. Ed agrees on the estimated time to do this job and in what has to be done. Ed apparently respects Morrison's judgment and ability, but at the same time he should let Morrison know Al's problem.

If I were Ed I would call both men into the office and have a general discussion. They would then talk in terms of each other's interests in getting the job done. It sometimes works like magic when those involved discuss every possibility in an emergency. There is no better way to get the job done than to get the other fellow's views and ideas and combine them with your own.

We had such a meeting several months ago about a very urgent order that had to be done on a machine that was in the toolroom under repairs. Attending this meeting were the production foreman, tool room foreman and the tool room leader. Two toolmakers and the



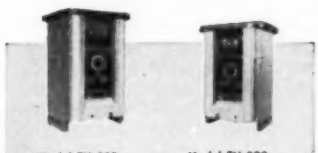
Turn the heat on—at the work!

Exclusive Dial-lectric control saves time and motion, cuts your welding costs

P&H built-in remote control puts heat selection just where your operators want it — at the work. Walking time is turned into welding time. Mount the welder on the wall—save valuable floor space. Welding is faster, sounder, better looking. Production goes up, costs go down.

Additional features are: Easy quick-start arc. Elimination of arc blow. No moving parts to cause delays or maintenance expense. High electrical efficiency that reduces power costs. NEMA rated.

See your P&H representative or distributor for full details.



Model TH-500 — Range 40 to 650 amps

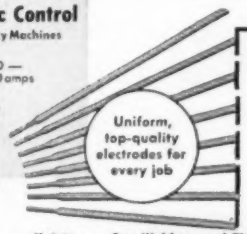
Model TH-300 — Range 30 to 400 amps

The only Complete Line of AC Welders with Dial-lectric Control

Also complete line of High-Frequency Machines

Model TI-200 — Range 30 to 275 amps

Model TI-150 — Range 20 to 190 amps



TEAR OUT THIS COUPON AND MAIL TODAY

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4514 W. National Ave.
Milwaukee 14, Wisconsin

Please send me additional information showing how P&H AC welders cut welding costs.

Name.....

Company.....Title.....

Address..... ☐ Home ☐ Business

City.....(...) State.....

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines Cane Loaders • Pre-assembled Homes

"Quick delivery"... that's only one of the things we mean by Service Plus!

● Customers tell us that "Quick delivery" and "United States Steel Supply Company" mean the same thing to them. When emergency repairs had to be made or a deadline had to be met, they tested our service and found that our "*quick delivery*" usually surpassed their most exacting demands. And in regard to ordinary deliveries, many customers, in a recent survey, wrote "I like your promptness."

"Service Plus" promises you more than speed, however. It is our reminder that we maintain a complete range of steel products, that requests for special products receive special attention, that every order, large or small, gets fast action from experienced personnel, and that you receive courteous, as well as prompt, treatment – always.

U·S·S Carilloy Alloy Steels Manufactured to a Guaranteed Minimum Hardenability
HOT ROLLED AND COLD FINISHED BARS · PLATES · STRUCTURALS · SHEETS
STRIP · STAINLESS · ALUMINUM · TOOLS · SUPPLIES · MACHINERY

WHEN YOU DEAL WITH US, YOU GET Service Plus!

UNITED STATES STEEL SUPPLY COMPANY

Warehouses:
BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES
MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH · PORTLAND, ORE.
SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL)
Also Sales Offices at: KANSAS CITY, MO. · PHILADELPHIA · TOLEDO
TULSA · YOUNGSTOWN
Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

superintendent were called in later. Here are some of the results of that meeting:

Two replacement parts were found which only needed one hour's work. This saved at least one day's time. It was found that another part was adjustable and a new part did not have to be made up. It was further decided, due to the urgency of getting this machine in operation, to put three men on it until completed. The final result was that the machine was put into operation in slightly less than three days against the original estimate of two to three weeks. The tool room foreman asked the production foreman to come to his office to discuss ways and means and then called the leader in. He talked to the leader in such a way that made him feel good by asking his advice and opinions. He also asked the production foreman if he had any suggestions and he used the good principles of human relations in talking to the two tool makers he later called in. He did not do much talking himself but he did praise and thank each man that came through with a suggestion. He made them all feel that they were on the winning team, and he showed honest appreciation and encouragement to all. After pulling out all the good suggestions of each man he called the superintendent, explained what they had accomplished, and received approval. He praised each man's part in the meeting.

I have met many a good mechanic but none who showed the ability as that tool room foreman in dealing with people. Someone once wrote that good principles of human relations are the inner muscles of man — the more we use them the stronger they grow. They are magic, positive magic in persuading men to talk things over, getting the other fellow's angle and ideas and examining the facts.

A. E. Salmons
Philadelphia, Pa.

•

The discussion of whether responsibility should be allowed to flow from an executive to a subordinate is age old. Some men look at it in the light that if you allow the men under you to have any ideas and are allowing them to carry out any of these ideas, maybe they are smarter than you are and they will some day get ahead. Now usually this type of supervision doesn't know as much as his men and is afraid of his own job. He usually sees to it that the ideas are recognized as his and that he gets all the credit.

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Vistac Oil

UNIT Main bearing-Sawmill Head-Rig Wheel

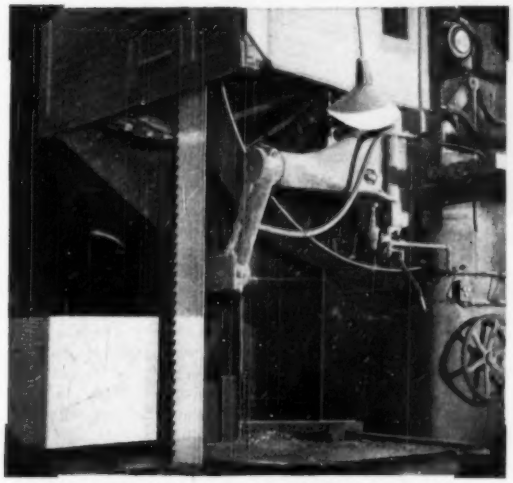
LUBRICATOR Drip-feed oiler

CONDITIONS Heavy pressures and tension—intermittent loads

PERIOD 2 years

FIRM California Door & Lumber Co. Diamond Springs, California

Tacky oil stops heavy-duty bearing failures

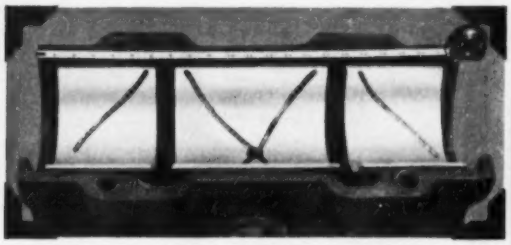


LUBRICATED WITH CALOL VISTAC OIL, the bearing in the 7-foot wheel of this head-rig has been in continuous use for more than two years. Before the sawmill changed to CALOL VISTAC Oil, the bearing had to be replaced every few months.

Mr. William Liddicolt, Mill Superintendent, says, "CALOL VISTAC Oil sticks tight, lubricates the entire bearing surface and doesn't squeeze off even under loads of 20,000 to 50,000 pounds. I also use CALOL VISTAC Oil on bearings in slashers and the hog. It really stands up under the continuous shock loads on hogger bearings!"

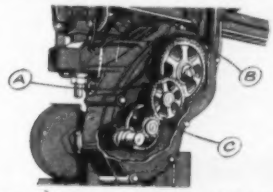
REMARKS: This plant has two band mills with 60-foot saws; handles heavy pine and fir timber. By keeping the bearings in these mills in good condition, CALOL VISTAC Oil has not only cut operating costs but prevented possible injury to personnel from saws that usually break when bearings go out.

CALOL



THE HEAD-RIG WHEEL BEARING in this mill is 7" in diameter, 21" long, babbitt lined, and has two oil rings. Because CALOL VISTAC is tacky, it carries over bearings, keeps tops lubricated, maintains a rust-proof coating during shutdowns.

How CALOL VISTAC Oil Cuts Costs on Metal-Machinery Equipment



Saves wear, prevents failure of bearings and gear trains in machine tools and press machinery; excellent air-tool lubricant. Note diagram of hoist gear unit for overhead crane:

A. Special additives in CALOL VISTAC Oil help form oily, pressure-resistant lubricating film.

B. Economical — small quantity will lubricate efficiently, dissipate heat.

C. Tenacious film cuts power loss and wear.

FOR MORE INFORMATION about this or other petroleum products, or the name of your nearest distributor, write or call any of the companies listed below.

Trademarks, "CALOL," "VISTAC" Reg. U. S. Pat. Off.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco
STANDARD OIL COMPANY OF TEXAS • El Paso, Texas
THE CALIFORNIA OIL COMPANY • Barber, N.J., Chicago, New Orleans
THE CALIFORNIA COMPANY • Denver, Colorado

1
SOURCE FOR ALL PARTS YOU NEED

LOCK WASHERS

High carbon steel, bronze, aluminum, stainless steel, monel metal, spring lock washers . . . finished or plated with cadmium, nickel, brass or copper. Also Garrett's Aluminum Spring Lock Washer—light in weight with strength of steel.

FLAT WASHERS

Made to meet ASA and SAE specifications in regular steel spring steel, stainless steel, brass, bronze, monel metal, aluminum, Alclad and copper. Can be plated with zinc, cadmium, nickel, brass, chrome . . . or can be parkerized.

STAMPINGS

From a small part for electronic instruments, automotive stampings and television chassis . . . Garrett can fabricate them better and cheaper than is possible in your own plant. Years of experience and modern high speed equipment assure speed deliveries . . . finished to your specifications.

SPRINGS

Flat and coiled springs to meet every requirement. Every Garrett spring has controlled tension built into it to assure satisfactory performance under all conditions. All types of flat springs . . . coil springs—compression, extension . . . made of round, square or rectangular wire.

MANUFACTURED BY
GEORGE K. GARRETT CO., INC.
PHILADELPHIA 24, PA.

GARRETT
MANUFACTURERS OF SMALL PARTS

ECONOMICAL TO OPERATE AND WILL GIVE MANY YEARS OF FAITHFUL SATISFACTORY SERVICE. NOTE THE WELL BUILT CONSTRUCTION AND THE LOW CENTER OF GRAVITY! FULL-AUTOMATIC AT ANY SPEED. DELICATELY RUGGED.

Unfortunately these men often hold their jobs for years. They become skilled in stealing ideas and passing them off as their own. Their employees do not have any respect for them but after all what can an individual worker do. He must earn his bread and butter and he isn't in a position to object because his boss takes the credit for something that he has suggested to the boss who turned it down by saying, "It won't work."

Supervisors who work on the other theory are all too few. They generally allow their men to submit ideas and try to build up men who can become key men later on. Their men enjoy working for them and would never attempt to overstep by giving false information.

It is true that caution must be used by the supervision regarding how the data given them are used. Naturally a supervisor can't just let his men always think that just because they say so that he is going to do it their way. He should always be sure that the ideas and plans that his assistants have are in keeping with the general policies of the company for which they work.

Now as to the problem that confronts Al: He isn't really as worried about Ed's getting into trouble as he is about where he is going to run the job. Had he been on his toes he would have known that his 14-in. lathe needed a general overhauling and would have planned his work around the overhauling schedule.

Maybe both men are at fault, for it would seem that no coordination had been made between production and the maintenance crew. Repair work must go on as does production, but both must be carefully tied together.

Al's remark of letting a subordinate dictate may have been justified if Ed hadn't checked the equipment and knew in his own mind how much repair work was needed. One should, as previously mentioned, always be sure that the data supplied is right as to the general facts. Let your subordinates tell you the details and relieve you of this portion of the work.

Build your men up, but don't overplay your hand. Know what goes on and know whether they are right in what they suggest. Give credit to them if they make a suggestion and you use it on the job. Use the time estimates that a worker gives you to check your own ideas. Both of you may be wrong but usually not in the same direction, so the elements tend to balance.

The most important thing in this whole issue is to know your men. Know who can be trusted and who will pull fast ones.

Charles D. Townsend
Fort Wayne, Ind.

TO THE EDITOR

Social Security?

Sir: Regarding your editorial "Our Most Important Resource" *AM*, Aug. 11, '49, pg. 87), I ask that you pass thru the looking glass and observe the *other* side.

Industry holds many elderly men

THE "LEADER" ON *Finishing* TAPS

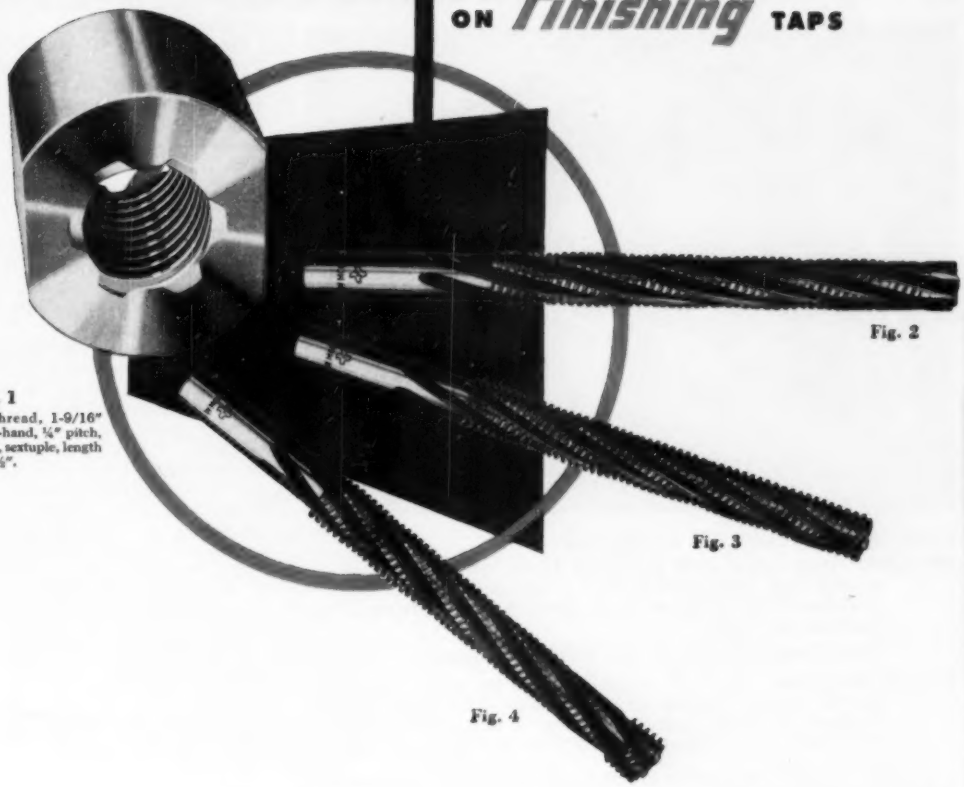


Fig. 1
Acme thread, 1-9/16" dia., left-hand, ¼" pitch, 1½" lead, sextuple, length of nut 3½".

Fig. 2

Fig. 3

Fig. 4

NO... this is not a self-applied pat on our own backs. Here's the story... and the pictures.

FIG. 1... shows a difficult tapping operation successfully performed with a set of 3 H-W "Finished Taps"... (finished after hardening).

FIG'S. 2-3-4... show the two reasons for the successful job... one, the spiral flutes at right angle to the thread, which give correct cutting action to both sides of the teeth... two, the "Leader" sections on taps (Fig's. 3-4), which correctly engage the thread cut by the first tap (Fig. 2), and follow exactly the same accurate path. This thread had to be chased until Hanson Process taps were used. The economy of "Finished Taps" is therefore evident... as are the design and accuracy of H-W taps.

HANSON-WHITNEY MACHINE CO., HARTFORD 2, CONN.
Division of Whitney-Hanson Industries, Inc.

Valuable engineering, illustrated catalog on request. Please use your business stationery.

Hanson Whitney
PIONEERS OF FINISHED TAPS

HWM50

Here's Where

HY-PRO taps paid 78 to 1

for a Plastics Manufacturer

PART: Molded Plastic Flat Iron Handle

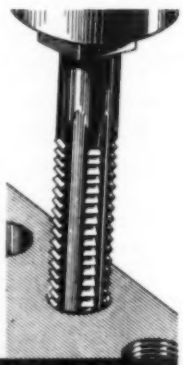
PROBLEMS: Taps being used to thread blind holes in molded plastic flat iron handles had a maximum life of 500 threaded holes in addition to spoiling many pieces by reaming out holes.

Then They Called in the HY-PRO Sales Engineer

HY-PRO SOLUTION: Hy-Pro's Engineer came up with a tap of special design having their exclusive HARDERNELL surface treatment. Results obtained in this highly abrasive plastic are fantastic—39,000 threaded holes per tap.

Above is a typical example of how the Hy-Pro Sales Engineer can help increase threaded-hole production. His expert engineering counsel backed by the most up-to-date tap production methods combine to solve tapping problems rapidly and profitably.

All Hy-Pro Taps are ground from tough uniform quality high-speed steel and given one of the Hy-Pro exclusive surface treatments.



Each tap is completely inspected by the latest electronic quality control equipment, your assurance that there will be no dimensional variance in Hy-Pro Taps of a stated size.

These precision manufacturing methods plus the ability of the Hy-Pro Sales Engineer to prescribe the correct tap for your particular job means *sustained accuracy* on your production line resulting in higher productivity from your tapping machines.

℞ Let Hy-Pro solve your tapping problem—call a Hy-Pro Sales Engineer today.

Order from your distributor.

HY-PRO TAPS

HY-PRO TOOL CO.

NEW BEDFORD, MASSACHUSETTS

A SUBSIDIARY OF CONTINENTAL SCREW COMPANY

because they serve a useful purpose. Of these men, large numbers would gladly retire, have earned a rest, but cannot afford to exchange a goodly salary check for a Social Security (?) pittance.

My suggestion is: Materially increase Social Security tax and payment to the aged to allow a man and his wife a minimum of $200 each month—a supporting income. Provide this sum until the death of both.

In this way, room would be made automatically for the younger men as the aged at the top retire. Youth, with ambition, could look forward a decade to definite executive positions. Employers would not be conscience-bound to retain employees beyond retirement age.

Citing my own experience: My professional record will show that 13 years after starting as an apprentice machinist I was an associate member, ASME, and a factory superintendent. Today, having survived the wreckage of 1932, at 81 years of age I work as a draftsman—for a pay check. You have recently published an article by me—from the correspondence you will know that I am alert. Yet circumstances beyond my control compel me to hold on to my job; thus keep a younger man out of a job.

Social Security (what a hoax) will allow my wife and me $56 per month—hardly sufficient to retire. It would be senseless for me to quit my job, yet my employer would gladly employ a newly trained college man in my place.

Mine is only one of many thousand cases—think it over.

NAME WITHHELD

"Now she's got all of us walking on tiptoes because she's got a cake in the oven."

DO YOU DO ANY INTERNAL GRINDING?

IF YOU DO, YOU'LL WANT THIS *NEW* CATALOG

2

THE INDEX

The following index is so arranged that the illustrations and dimensional data covering many Pope Precision Internal Grinding Spindles can be readily located by either the Type of Spindle (Removable Extension Arbor — Solid Extension — Deep Hole), by the Grinding Machine to which the spindle is applicable, or by Style Number.

GENERAL ARRANGEMENT OF CATALOG

Removable Extension Arbor Type Spindles . . . Pages 7 thru 20
Removable Extension Arbors (Quills) . . . Pages 21 thru 24
Removable Collet Chucks . . . Page 25
Solid Extension Type Spindles . . . Pages 26 thru 33
Deep Hole Type Spindles . . . Pages 34 thru 66
Spindle Mounting Brackets . . . Page 67

SPINDLES BY MANUFACTURER OF GRINDER

BROWN & SHARPE MFG. CO.
Universal Grinders No. 1 and 13
Removable Extension Arbor Type . . . Page 7
Solid Extension Type . . . Pages 26 and 27
Deep Hole Type . . . Page 34
Universal Grinder No. 2, 3 and 4
Removable Extension Arbor Type . . . Page 8
Solid Extension Type . . . Pages 28 and 29
Deep Hole Type . . . Page 35

BRYANT CHUCKING GRINDER CO.
Internal Grinder No. 12
Removable Extension Arbor Type . . . Page 9
Solid Extension Type . . . Pages 30 and 31
Deep Hole Type . . . Page 36
Internal Grinder No. 16
Removable Extension Arbor Type . . . Page 10
Solid Extension Type . . . Pages 32 and 33
Deep Hole Type . . . Page 37
Internal Grinder No. 112
Removable Extension Arbor Type . . . Page 11
Solid Extension Type . . . Pages 34 and 35
Deep Hole Type . . . Page 37

CINCINNATI GRINDERS, INC.
Universal Grinder No. 10
Removable Extension Arbor Type . . . Page 12
Solid Extension Type . . . Pages 36 and 37
Deep Hole Type . . . Page 38
Universal Grinders No. 12, 14, 16 and 18
Removable Extension Arbor Type . . . Page 13
Solid Extension Type . . . Pages 38 and 39
Deep Hole Type . . . Page 39

HEALD MACHINE CO.
Internal Grinders No. 70, 70A, 72, 72A, 73, 73A, 81 and 172
Removable Extension Arbor Type . . . Page 14
Solid Extension Type . . . Pages 40 and 41
Deep Hole Type . . . Page 60

LANDIS TOOL CO.
Universal Grinders No. 1, 1½, 2, 3 and 4
Removable Extension Arbor Type . . . Page 15
Solid Extension Type . . . Pages 42 and 43
Deep Hole Type . . . Page 61

NORTON COMPANY
Type "C" Multipurpose Grinder
Removable Extension Arbor Type . . . Page 16
Solid Extension Type . . . Pages 44 and 45
Deep Hole Type . . . Page 62
10 x 20 Universal Grinder
Removable Extension Arbor Type . . . Pages 17 and 18
Solid Extension Type . . . Pages 46, 47, 48 and 49
Deep Hole Type . . . Pages 63 and 64

RIVETT LATHE AND GRINDER CO.
Internal Grinder No. 1054
Removable Extension Arbor Type . . . Page 19
Solid Extension Type . . . Pages 50 and 51
Deep Hole Type . . . Page 65
General Purpose Spindles other than those listed for specific Grinding Machines are available and illustrated herein.
Removable Extension Arbor Type . . . Page 20
Solid Extension Type . . . Pages 52 and 53
Deep Hole Type . . . Page 66

INDEX BY STYLE NUMBER

Style Numbers	DESCRIPTION	PAGE
39-75	Spindle Mounting Bracket (for straight spindles)	67
39-75H	Spindle Mounting Bracket (for flanged spindles)	67
441-57	Tapered Shank Removable Collet Chucks (in various sizes suitable for gripping tools with shanks from 1/64 to 9/16 inches in diameter)	67
C-1001 thru C-1005	Removable Extension Arbors (Quills) 7/16 inch Series	85
P-1101 thru P-1112	Removable Extension Arbors (Quills) 5/8 inch Series	91
P-1120 thru P-1144	Removable Extension Arbors (Quills) 3/4 inch Series	91
P-1155 thru P-1183	Removable Extension Arbors (Quills) 1 inch Series	92
P-1190 thru P-1232	Removable Extension Arbors (Quills) 1 3/8 inch Series	93
P-1240 thru P-1278		94

No. 66

Look at this index page and you'll get some idea of the scope, utility and time-saving value of this new Catalog.

POPE Internal Grinding Spindles with super-precision bearings properly mounted and preloaded and having the Pope System of Sealed-in Lubrication are designed, built and dynamically balanced to increase your production and reduce your costs.

GET YOUR COPY OF THIS NEW REFERENCE BOOK
MAIL THIS COUPON ▶

POPE MACHINERY CORPORATION A
261 River Street, Haverhill, Massachusetts

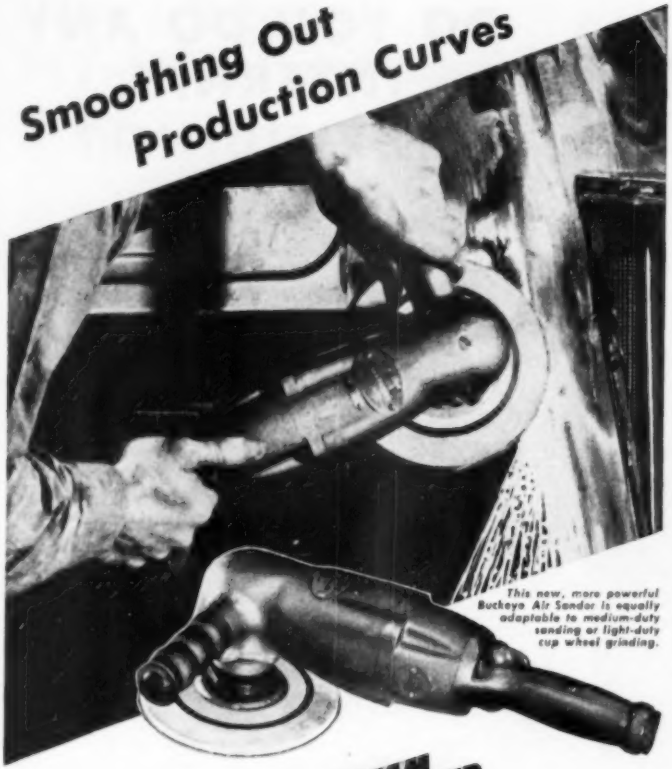
Gentlemen: Please mail me, without obligation or personal follow-up, your new CATALOG No. 57

Name ..... *Position* .....

Company .....

Address .....

Smoothing Out Production Curves



This new, more powerful Buckeye Air Sander is equally adaptable to medium-duty sanding or light-duty cup wheel grinding.

The BUCKEYE STREAM POWER AIR SANDER

• The new Buckeye Air Sander is one of many Buckeye Air Tools used by Advance Auto Body Works in the manufacture of truck bodies and tank and trailer units for the petroleum and motor transportation industries. On fabrication work, weld removal and tank and body finishing, Buckeye Air Tools have reduced maintenance costs, tool down time and lost man-hours . . . have helped maintain a higher rate of productivity at this Los Angeles plant.

Designed and built to stay on the job, Buckeye Air Tools can help you maintain productive output at profitable levels. We'll gladly demonstrate, in your own plant, without obligation—and let you be the judge.

AIR TOOLS:

• Horizontal Grinders and Buffers • Vertical Grinders and Sanders • Belt Sanders • Shears Nibblers • Air Wrenches • Drills Screwdrivers

NEED HELP on Air Tool Problems?

Send now for your copy of the informative Buckeye Air Tool Catalog.

HIGH FREQUENCY ELECTRIC TOOLS:

• Grinders • Buffers • Sanders Polishers • Drills • Screwdrivers Nutrunners

Buckeye Tools CORPORATION

DIVISION 15 • DAYTON 1, OHIO

Railroad Apprentices

I was much interested in the article on Railroad Shop Apprentices, not only because I spent a lot of time studying the problem, 40 years ago, but also because I spent hours with the former head of Apprentice Training on the New York Central Systems and traveled with him to the various schools. This shows how long the New York Central has been interested in apprentice training.

I was particularly pleased with one phase of the program, as practiced at the Collingwood shops, near Cleveland. It was the plan to start a new boy with the erection crew, instead of sticking him on an old bolt cutter, as was once done in too many shops. Nothing can discourage a boy more quickly than to be kept on such an uninteresting repetitive job as bolt cutting or nut tapping.

On the other hand, working with the erecting crew, he learned rapidly about the various parts of a locomotive and the tools used in such work. He learned something about fits necessary for different parts of the locomotive. When the boy was put on lathe or other machining jobs, his experience with the erecting crew stood him in good stead.

Fred H. Colvin
Point Pleasant, N. J.

NEW BOOKS

WORKING WITH PEOPLE. *By Auren Uris and Betty Shapin, Editors, Human and Labor Relations, The Research Institute of America. Published by The Macmillan Company, 60 Fifth Ave., New York City. 311 pages, 5½x8 in., Price $3.*

Applied human relations, from a "novel" approach, provides the reader with valuable information in a readily assimilable form. To properly lead people, one must first understand himself and the people he would lead. Written in dialogue style, "Working With People" puts the reader in the boss' position—gives him a personal interest in each problem. And an insight to people that offers happier homelife as well as business associations. There is diagnosis and prescription for many friction points in human relations. Some of those included are: how to recognize the strengths and weaknesses of various personality types; how to present new ideas persuasively and avoid the resistance often met by strange and untried ideas; how to handle a worker's grievance successfully; how to get along with a difficult boss.

Gear errors and Gear noise

should be discovered long before the gears reach final assembly . . .

There is a profit in scrap for the scrap dealer, but most certainly not for the gear manufacturer who suddenly discovers that an entire lot of gears have to be scrapped because they fail to meet tolerance requirements or because they are too noisy.

If economy is important in your plant, the time to find out about machining errors is right at the machine which causes the trouble—not after all the subsequent operations including heat treatment have been completed and the gears assembled in some power unit.

The best insurance against high cost of scrap gears is the use of gear checking machines right down there in the plant where the gears are being produced and where they can be checked periodically by the machine operators.

The Red Ring Gear Checker quickly reveals any dimensional errors and the Red Ring Gear Sound Tester immediately puts an accusing finger on noisy gears. Both machines have laboratory accuracy, they can be used anywhere in the plant or inspection department and they prevent a great deal of waste.

Get all the details by writing for Descriptive Bulletins.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.

3600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

WORLD'S STANDARD
of
Angle Measurement
H.D. BLOCKS and FIXTURES
STANDARD STEEL BLOCKS
CARBLOX CARBIDE
ANGLE BLOCKS
Degrees, minutes and seconds in any combination are at your fingertips with a positiveness and speed that has never before been equalled.
The accuracy of the laboratory has actually been brought into the shop. Information on this newest Webber contribution to precision is yours on request.
Webber
GAGE COMPANY
12901 TRISKETT RD.,
CLEVELAND 11, OHIO
LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS
LATEST PRICE LIST
Webber Gage Blocks
STANDARD STEEL BLOCKS B Accuracy ± .000008"
84B-84 block set $235.00
43B-42 block set 150.00
38B-38 block set 155.00
STANDARD CARBIDE (CARBLOX) B Accuracy ± .000008"
82B-82 block set $1,175.00
33B-33 block set 495.00
Carblox Wear Blocks .100" set of 2 with case 21.50
For price list on Standard Steel and Carbide "A" blocks (accuracy ± .000004") or special blocks, write or wire.
ANGLE GAGE BLOCKS
16A-16 blocks $450.00
HEAVY DUTY GAGE BLOCKS AND FIXTURES Accuracy ± .000005"
36 H.D. $450.00
24 H.D. 385.00
WEBBER GAGE COMPANY
12901 Triskett Road • Cleveland 11, Ohio

The authors, by the nature of their positions, are in an excellent vantage point to select the most predominant problems and the most effective solutions. They have presented these in a manner both palatable and practical for all who would better their understanding of people.

•

METAL CLEANING BIBLIOGRAPHICAL ABSTRACTS. *By Jay C. Harris. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. 68 pages. Price $2.75.*

This book (Special Technical Publication No. 90) presents in compact form a tremendous amount of information on metal cleaning which should be of interest to all those concerned with the subject.

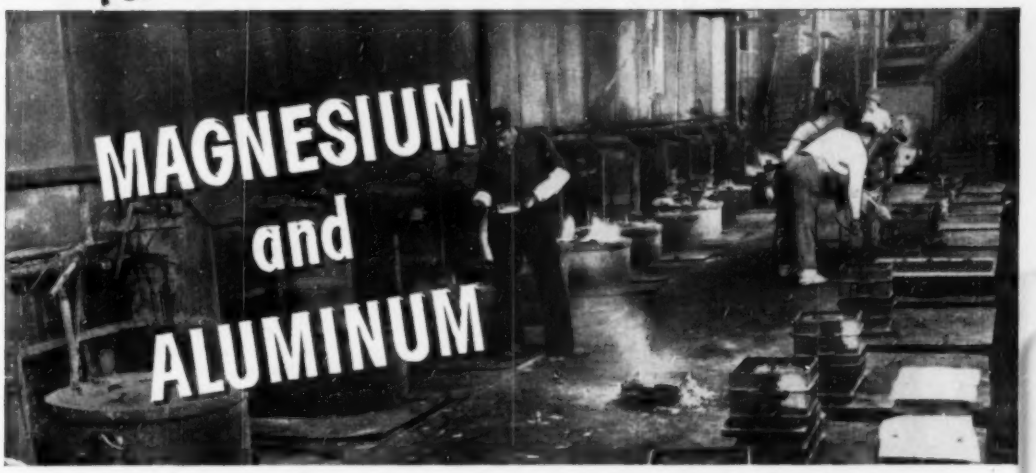
The references are arranged by year and by author, and are numbered consecutively with specific numbering sequence. There are about 500 references, and as far as possible the original articles have been abstracted, although some material is reabstracted from other journals.

•

REPORTS OF THE METAL TRADES COMMITTEE, *International Labor Office, Third Session, Geneva, 1949. Set of three paperbound books: "General Report," 253 pages; "Vocational Training and Promotion in the Metal Trades," 164 pages; "Systems of Wage Calculations in the Metal Trades," 138 pages. Published by International Labor Office, Geneva. Order from Washington Branch, 1825 Jefferson Place, N.W., Washington 6, D.C. Price of Set $3.25.*

How much longer the rest of the industrial world will need American financial help is a question being asked more and more in the face of this government's deficit financing policy for the next fiscal year. Some of the answers can be drawn from the "General Report" in this ILO series, which presents such excellent tabular material as "Production Recovery in European Metal Trades," "Approximate Planned Production Levels of Seven OEEC Countries," and "Stated Equipment Requirements in Selected Programmes of the ERP, 1948-51." Of special interest is a chapter on "The Metal Trades in the World Today" which tells of the evolution of the metal trades since

For Basically Better Castings . . .



Call on the ECLIPSE-PIONEER
Foundries

From the complete metallurgical and X-ray laboratories to the final inspection before shipment, every department in the Eclipse-Pioneer Division Foundries employs the most modern techniques and testing devices available. In addition, every phase of production is conveyorized and mechanized for more economical and efficient handling of materials—a feature which is reflected in the reduced cost of the fine quality castings. During more than nineteen years of experience with difficult casting problems, the Eclipse-Pioneer Division Foundries have produced such diversified items as all-cast parts of the lightest known lawn mower, lightweight hand power tools and aircraft gun turret gimbals. For more detailed information send for Eclipse-Pioneer's illustrated Book of Facts today.

- **SAND CASTINGS**
- **PERMANENT MOLD CASTINGS**
- **DIE CASTINGS**

PLEASE SEND ME THE ECLIPSE-PIONEER "BOOK OF FACTS" ON MAGNESIUM, ALUMINUM AND BRONZE CASTINGS.

NAME _____ TITLE _____

COMPANY _____ STREET _____

CITY _____ ZONE _____ STATE _____

AND PRECISION (±.005")

PLASTER MOLD CASTINGS

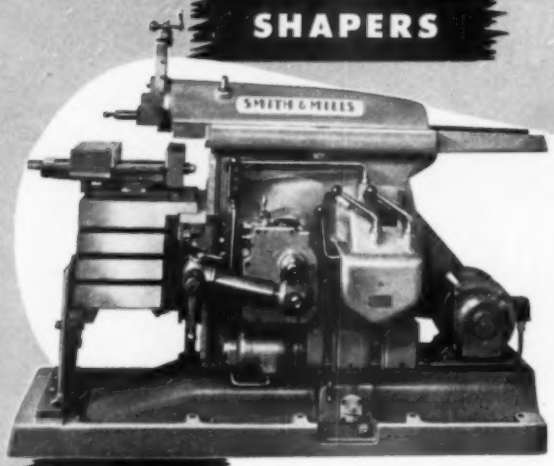
ECLIPSE-PIONEER DIVISION FOUNDRIES
BENDIX AVIATION CORPORATION
TETERBORO, N. J.

Bendix AVIATION CORPORATION

NEW VERSATILITY...

FOR SMITH & MILLS

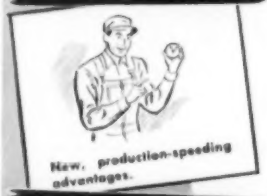
SHAPERS



Added Sizes

Four new sizes to round out the complete line.

More Time-Saving Features



New, production-speeding advantages.

Greater Capacity

New Specials for shaping larger castings.

Added sizes, more money-saving advantages and greater job capacities now make Smith & Mills Shapers more versatile . . . give them sharply increased productivity.

Four new sizes, 20" and 24" Standard, and 14" and 36" Heavy Duty, have been added to round out the complete line.

New features cut setup and machining time sharply. Included are such advantages as horizontal and vertical power rapid traverse to the table; automatic tool lifter; tool head indexing unit; front hand feed, and automatic vertical feed to tool.

Two additional new models are now available for shaping larger castings. These are the 32" and 36" Specials, with greater capacity under the ram, and longer cross travel.

Write Dept. AM-2 for full details and your copy of catalog.

SMITH & MILLS SHAPERS, Inc.

DIVISION OF HAMILTON THOMAS CORP. HAMILTON, OHIO

before the war in automobile production, shipbuilding, aircraft, machine tools, and production of tractors and farm machinery. The work of the metal trades in eastern Europe is also sketched here. The other two reports discuss broad problems and requirements in the metal trades, and give information on training programs and wage calculation systems in the various countries.

•

MECHANICAL WORLD YEAR BOOK (1950). *Published by Emmott & Co., Ltd., 31 King St. West, Manchester 3, England. 269 pages, 4 x 6¼. Price three shillings, sixpence.*

Completely revised, this new edition of a popular British handbook contains a large and comprehensive section giving fundamental data applicable directly to the gas turbine. Much of the other matter, and particularly the many tables, has been rearranged to bring similar and related subjects together for easier reference. A new index has been compiled, and the contents page expanded to facilitate locating desired items.

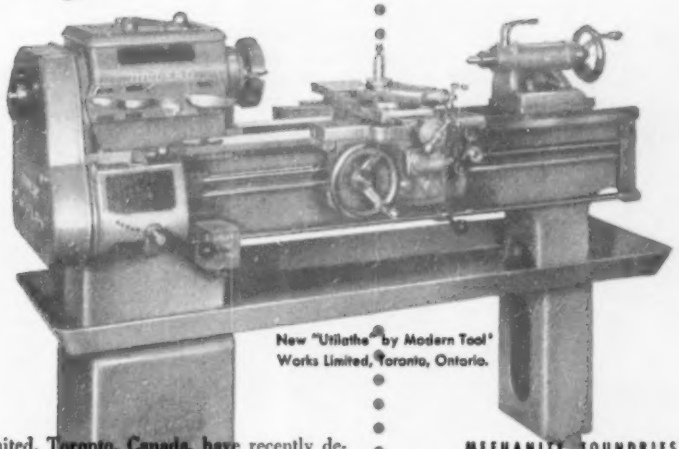
•

CONSTRUCTIVE USES OF ATOMIC ENERGY—*Edited by S. C. Rothman, Published by Harper & Brothers, 49 E. 33rd St., N.Y.C., N.Y. 258 pages, 5½ x 8 in. Price $3.*

Thought, in terms of atomic energy, these days is largely devoted to its effect on the balance of power and ability of nations to declare or avoid war. Leaders in the field of nucleonics have ambitions for atomic power which are far more enlightening. To them, it is a door opening into an era of inestimable good. In this book, some of the more famous authorities devote a chapter each to the field of their own endeavor. Fourteen scientists including Compton, Chubb, Allison, Carlin, Etherington, Rhoads, plus eight others, write of developments thus far and those expected. Industrial power, chemical, aviation, agricultural, biological and medical research are discussed; past, present, and future.

Written in simple, non-technical language, it is a book for the layman. In these days when the world is worried by atomic fears, it is good to read that the same source also promises health and comfort.

Machine Tool Precision Requires MEEHANITE® *Properties and Quality*



New "Utilathe" by Modern Tool Works Limited, Toronto, Ontario.

THE Modern Tools Works Limited, Toronto, Canada, have recently designed and are now producing an entirely new lathe known as the MODERN "Utilathe", illustrated. Machine tools manufactured by this company have acquired a reputation for precision accuracy and maximum performance in production.

From its inception this machine was designed to take full advantage of those engineering properties of Meehanite castings which would contribute to its quality, such as good strength characteristics, maximum vibration absorption, dimensional stability, uniform solidity and good machinability. These castings include:

1. Bed
2. Carriage
3. Cross Slide
4. Compound Slide
5. Headstock
6. Tailstock

Designers of this equipment, like those of many other machine tools "design with confidence" based on their sure knowledge that Meehanite castings over the years provide, regularly and repeatedly, known and established engineering characteristics. Builders of today's equipment rightfully demand this assurance of dependability.

Your product—your new design, can benefit similarly.

For further information write for the Handbook of Meehanite Metals to any of the foundries listed.

MEEHANITE FOUNDRIES

American Brake Shoe Co.	Mahwah, N. J.
The American Laundry Machinery Co.	Rochester, N. Y.
Atlas Foundry Co.	Detroit, Mich.
Banner Iron Works	St. Louis, Mo.
Barnett Foundry & Machine Co.	Irvington, N. J.
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry Inc.	Providence, R. I.
H. W. Butterworth & Sons Co.	Bethayres, Pa.
Continental Gin Co.	Birmingham, Ala.
The Cooper-Bessemer Corp.	Mt. Vernon, O. and Grove City, Pa.
Crawford & Doherty Foundry Co.	Portland, Ore.
Farrel-Birmingham Co., Inc.	Ansonia, Conn.
Florence Pipe Foundry & Machine Co.	Florence, N. J.
Fulton Foundry & Machine Co., Inc.	Cleveland, O.
General Foundry & Manufacturing Co.	Flint, Mich.
Greenlee Foundry Co.	Chicago, Ill.
The Hamilton Foundry & Machine Co.	Hamilton, O.
Johnstone Foundries, Inc.	Grove City, Pa.
Kanawha Manufacturing Co.	Charleston, W. Va.
Koehring Co.	Milwaukee, Wis.
Lincoln Foundry Corp.	Los Angeles, Calif.
E. Long Ltd.	Orillia, Ontario
Otis Elevator Co., Ltd.	Hamilton, Ontario
The Henry Perkins Co.	Bridgewater, Mass.
Pohlman Foundry Co., Inc.	Buffalo, N. Y.
The Prescott Co.	Menominee, Mich.
Rosedale Foundry & Machine Co.	Pittsburgh, Pa.
Ross-Meehan Foundries	Chattanooga, Tenn.
Shenango-Penn Mold Co.	Dover, O.
Smith Industries, Inc.	Indianapolis, Ind.
Standard Foundry Co.	Worcester, Mass.
The Stearns-Roger Manufacturing Co.	Denver, Colo.
Taylor Engineering & Mfg. Co.	Allentown, Pa.
Valley Iron Works, Inc.	St. Paul, Minn.
Vulcan Foundry Co.	Oakland, Calif.
Warren Foundry & Pipe Corporation	Phillipsburg, N. J.

"This advertisement sponsored by foundries listed above."

Meehanite NEW ROCHELLE, N. Y.

Microhoning FLAT SURFACES

Removes stock rapidly without distortion. Generates accurate flatness, controlled functional finishes and parallelism—High production.

All types of flat bearing and sealing surfaces can be productively MICROHONED to accuracies of one light band or less and to any degree of surface finish. New MICROFLAT machines are adaptable to parts of any size, material or shape.

...ace ...ines ...and ...on ...es in ...n. As ...parts— ...s are ...D in one ...aces are ...hin .0001", ... as .005" ...moved in less ...ne minute—pro- ...len over 1000 per ...our.

MICROMATIC HONE CORPORATION 8100 SCHOOLCRAFT AVENUE DETROIT 4, MICHIGAN

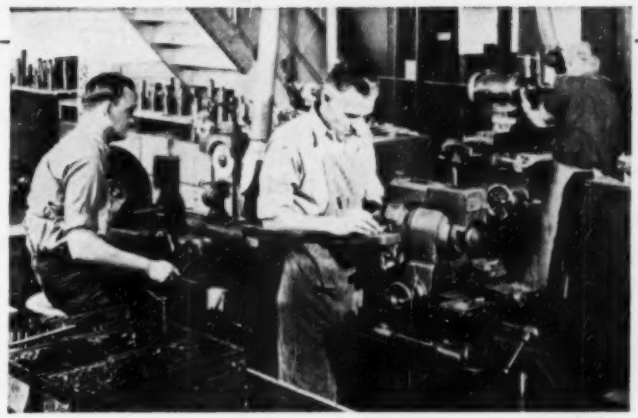
District Field Offices: 1323 So. Santa Fe., Los Angeles 21, California · 614 Empire Building, 206 So. Main St., Rockford, Illinois
55 George St., Brantford, Ontario, Canada · Micromold Manufacturing Div., Boston Post Road, Guilford, Connecticut

Here's one of 8 important ways you, too, can slash variable costs with "Triple C"

THE CARBOLOY "TRIPLE C" PLAN

COORDINATED CARBIDE CONTROL

FOR EVEN GREATER SAVINGS WITH CARBIDES



35% Reduction In Tool Breakage —*almost overnight!* Carboloy's money-saving "Triple C" Plan accomplished this for a large Eastern machine company. This unique plan of Coordinated Carbide Control will increase production and lower manufacturing costs in your carbide tool operations, too.

Today, top management is watching all phases of business with reference to the Break-Even Point.

Here's an example of how Centralized Carbide Grinding, as provided by the CCC Plan, helped reduce just one variable expense — tooling costs.

Top management is sold on CCC as a remedy for high break-even point headaches.

For "Triple C" goes right to work on your variable expenses—as witness a large Eastern machine works* report a 40% reduction in tooling costs! Centralized carbide grinding is the answer, and here's how it works under "Triple C":

- Predetermined grinding specifications and advance job knowledge eliminate tool crib delay.
- Grinding room layouts utilize all equipment to a maximum; eliminate idle time and unnecessary duplication.
- Grinding machine selection affords maximum economy and efficiency.
- Organized records provide correct specifications instantly.

Let "Triple C" go to work in your plant—reducing costs, increasing production and eliminating waste. Now is the time to discover that CCC spells savings for you. Write for further information. Carboloy Company, Inc., 11149 E. 8 Mile Ave., Detroit 32, Michigan.

*Name on Request

CARBOLOY®

CEMENTED CARBIDE

Coordinated Carbide Control can help you lower your all-important break-even point in these eight major phases of carbide use:

Tool Design • Tool Inventory Control • Tool Requisitioning • Tool Application • Tool Grinding • Tool Fabrication • Trouble Shooting • Personnel Training

Carboloy Company, Inc.
11149 E. 8 Mile Ave., Detroit 32, Michigan

Dear Sirs:

We want to know more about the Carboloy "Triple C" Plan to help lower our Break-Even Point. Without obligation, send us a copy of your CCC Plan Book for management and supervisory executives.

Name_____

Position_____

Firm_____

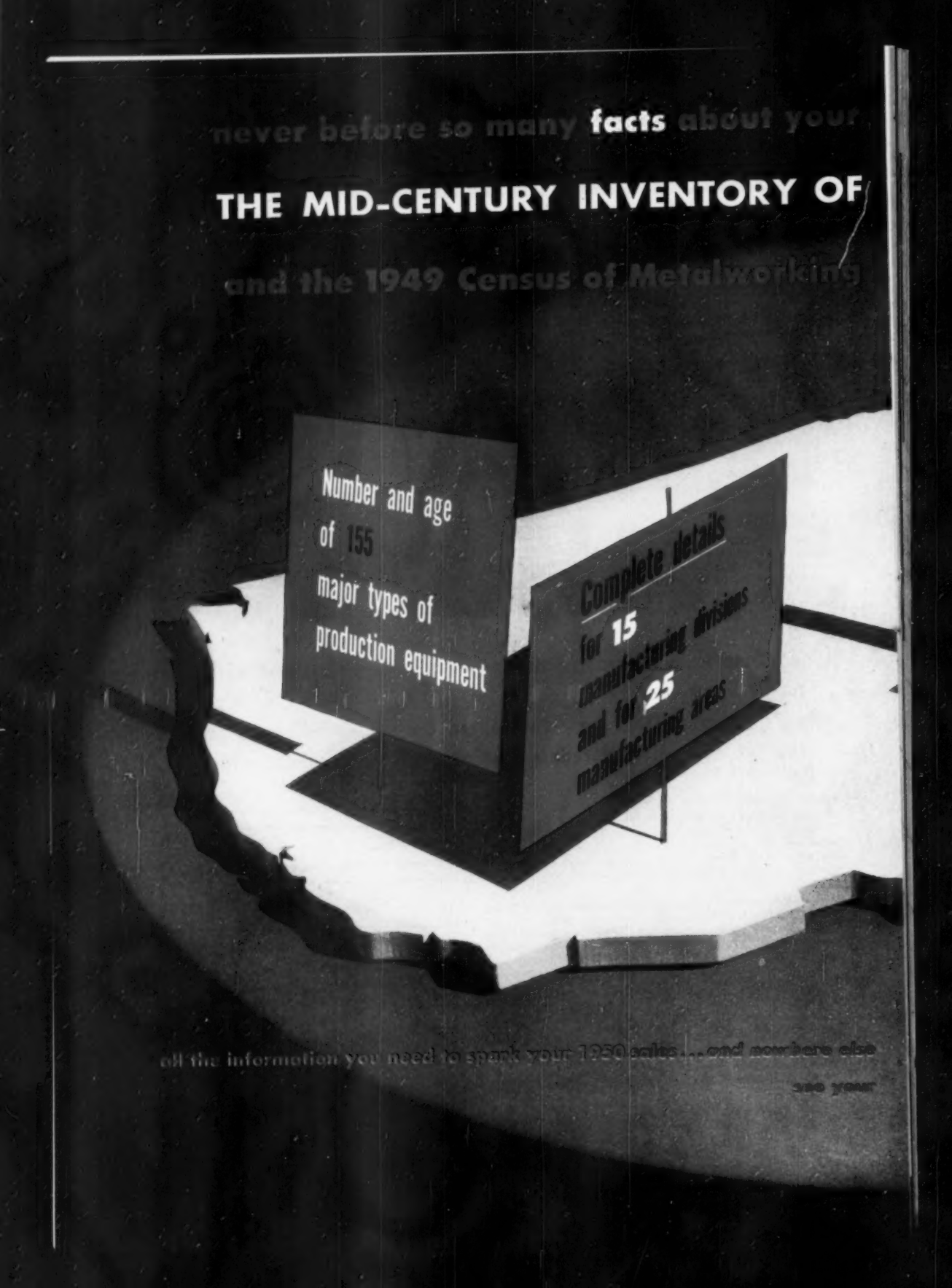
Address_____

City_____ Zone____ State_____

never before so many **facts** about your

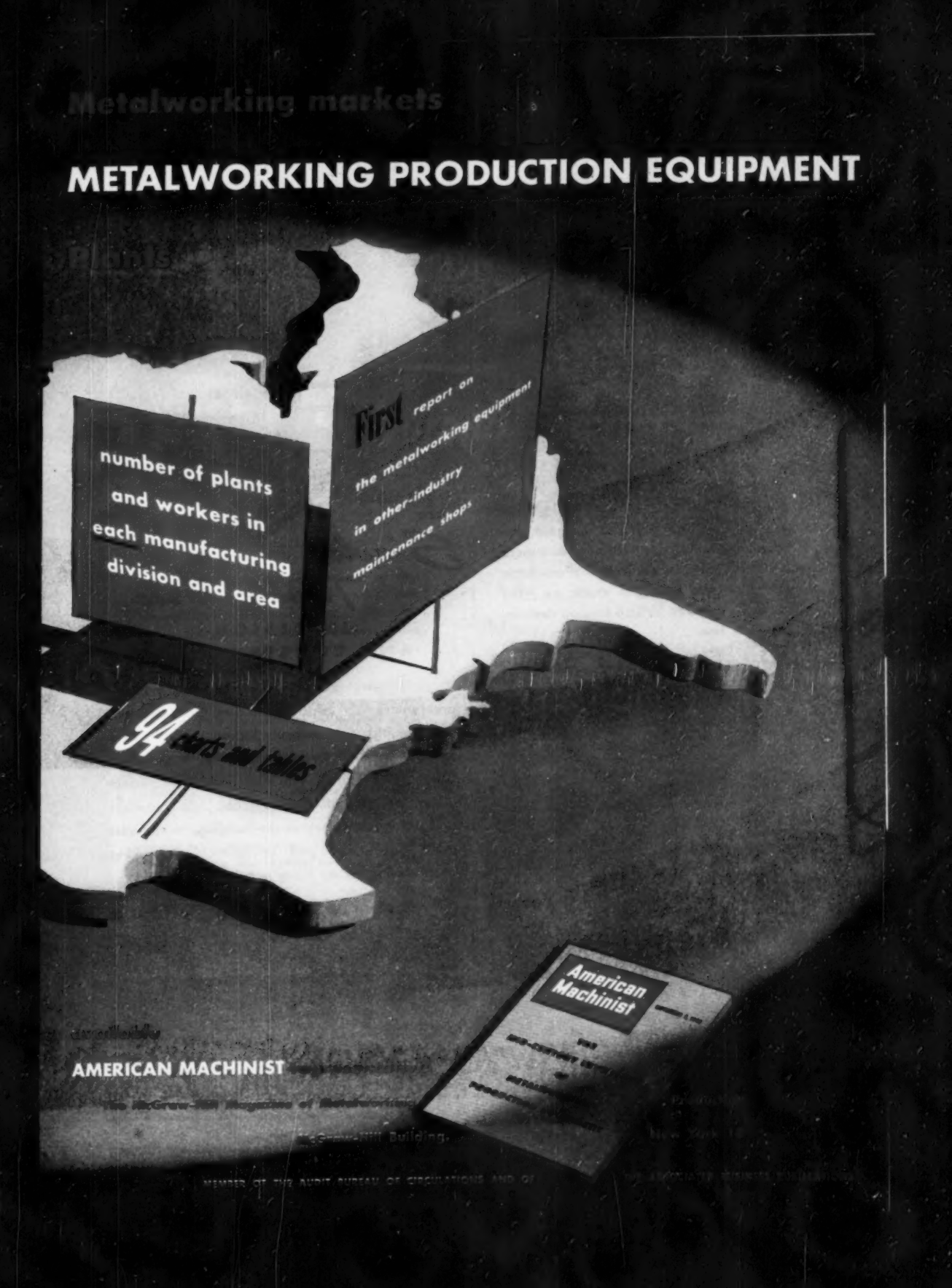
THE MID-CENTURY INVENTORY OF

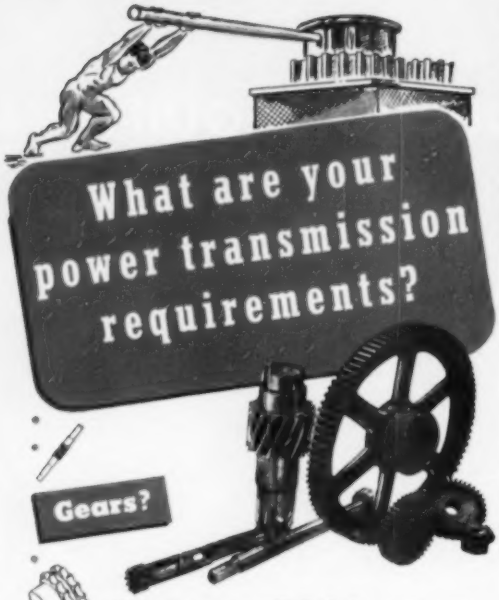
and the 1949 Census of Metalworking


Number and age of 155 major types of production equipment
Complete details for 15 manufacturing divisions and for 25 manufacturing areas

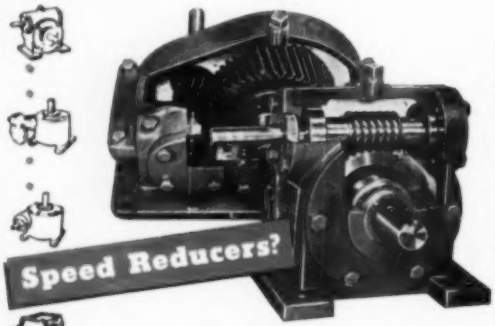
all the information you need to spark your 1950 sales ... and nowhere else

see your


Metalworking markets
METALWORKING PRODUCTION EQUIPMENT
number of plants and workers in each manufacturing division and area
First report on the metalworking equipment in other-industry maintenance shops
94 charts and tables
American Machinist
AMERICAN MACHINIST



Chances are you'll find the gear you want available from Grant's mammoth stock. If not, complete facilities are available to cut all types. Deliveries made on your schedule. Write today for free catalog describing complete line.



Worm, double worm, compound worm and spur, helical, mitre gear — Grant makes them all . . . reductions up to 3660-1 . . . most types available from stock. Write for catalog describing each type in detail.

Special requirements? . . . unusual and difficult jobs are a Grant specialty . . . for an estimate write outlining your problem.

Grant GEAR WORKS INC.

169 W. SECOND STREET
SO. BOSTON, MASS.

INTERCHANGEABLE PUNCHES and DIES

are

Simple, Trouble-Free

IN DESIGN AND CONSTRUCTION

Any press operator can quickly install and remove punches and dies. Once inserted, however, they are securely locked vertically and radially by ball bearing locks for trouble-free press performance. Precision-made for perfect alignment and interchangeability, punches and dies save money in die-building, in reduced press "down-time," and, unlike most die-making parts, because they have a salvage value.

standardized punches and dies are stocked for immediate delivery. Punches and dies of special sizes, shapes and materials are made promptly to your specifications.

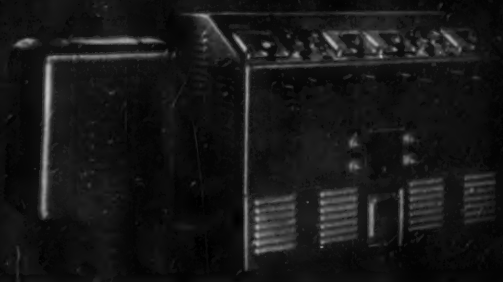
GET THE WHOLE STORY IN THIS FREE CATALOG

A 48-page book with full information on Allied's "one stop service." Write for your copy.

ALLIED PRODUCTS CORPORATION

Department 40
12605 Burt Road • Detroit 23, Mich.

Power Unit with cabinet removed; valves are gasket mounted to simplify installation, save space, improve machine appearance.



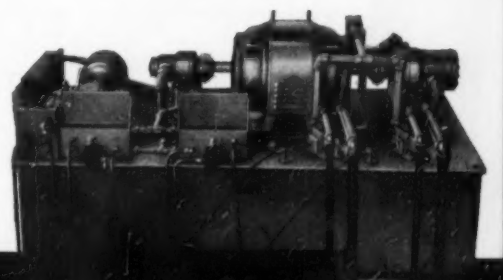
Power Unit having pump driven by standby gasoline engine.

VICKERS Hydraulic POWER UNITS *Custom Built*

Illustrated here are representative examples of the infinite variety of self-contained hydraulic power Units that are designed and built by Vickers for the more efficient operation of many kinds of machinery. These compact Units include all necessary pumps, valves, intermediate piping, reservoir, hydraulic accessories, motors and controls. Hydraulic connections to the machine are grouped in a convenient manifold.

Design is simplified because arrangement is not limited by structure of machine. Installation time and cost are substantially reduced because all hydraulic equipment is received as a self-contained "package" instead of separate parts that must be individually installed. Every Unit is pretested at factory and is ready for immediate operation. Cabinets which are optional, blend well with modern machine design. Operating adjustments and maintenance are simplified by convenient layout and gasket mounted valves. Vickers Custom Built Power Units have other important advantages . . . ask for Bulletins 47-45 and 46-43.

- **Simplify Design**
- **Reduce Installation Costs**
- **Improve Appearance**
- **Save Time**
- **Easier Maintenance**

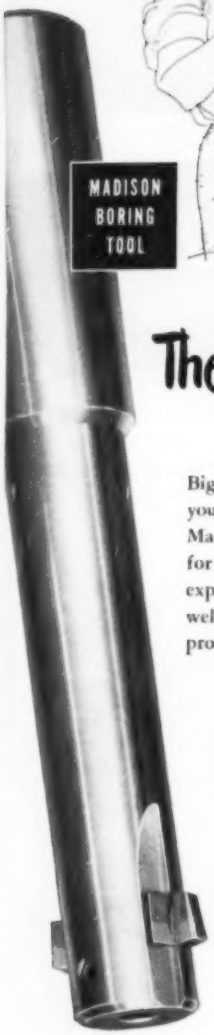


Power Unit is placed in base of machine . . . console control where convenient to operator.

VICKERS
Incorporated
DIVISION OF THE SPERRY CORP.

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Application Engineering Offices: ATLANTA • CHICAGO • CINCINNATI CLEVELAND • DETROIT • HOUSTON • LOS ANGELES (Metropolitan) MILWAUKEE • NEW YORK (Metropolitan) • PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA WASHINGTON • WORCESTER



The Men with the Holes in their Heads!

can lower your boring costs

Big holes! Little holes! Deep holes! How can we bore 'em better for less? This may be your problem occasionally. But boring holes at lower cost is the full time problem for Madison engineers. This specialization can save *you* money just as it is doing every day for leading manufacturers. Why not take advantage of the two big things — Madison experience and Madison tools — that can cut cost on your production boring jobs. You're welcome to put another hole in one of our engineers' heads. Ask them to consider your problem and come up with a cost lowering idea. No obligation, of course.

BETTER BORING TOOLS

Madison Cutters in Madison Bars . . . the best in boring tools. Madisons give you superior finishes, in most cases equalled only by grinding. Tolerances to .0003. Two-bladed cutter that expands to make up for wear in regrinding — also quickly changed from one size to another with no disturbance of the set-up. Cutter floats in the bar — no special floating tool holders needed. More holes per cutter before regrinding and more regrinds per cutter (about 10 times as many as similar tools) . . . and many other original Madison features of design.

MORE BORING EXPERIENCE

For 35 years Madison has concentrated on solving boring problems. With this background of experience applied to your production job, you can count on the best solution to save your money. What's more, you can count on a recommendation based on a complete line of boring tools.

Write for the information filled Madison Catalog: It is yours for the asking.

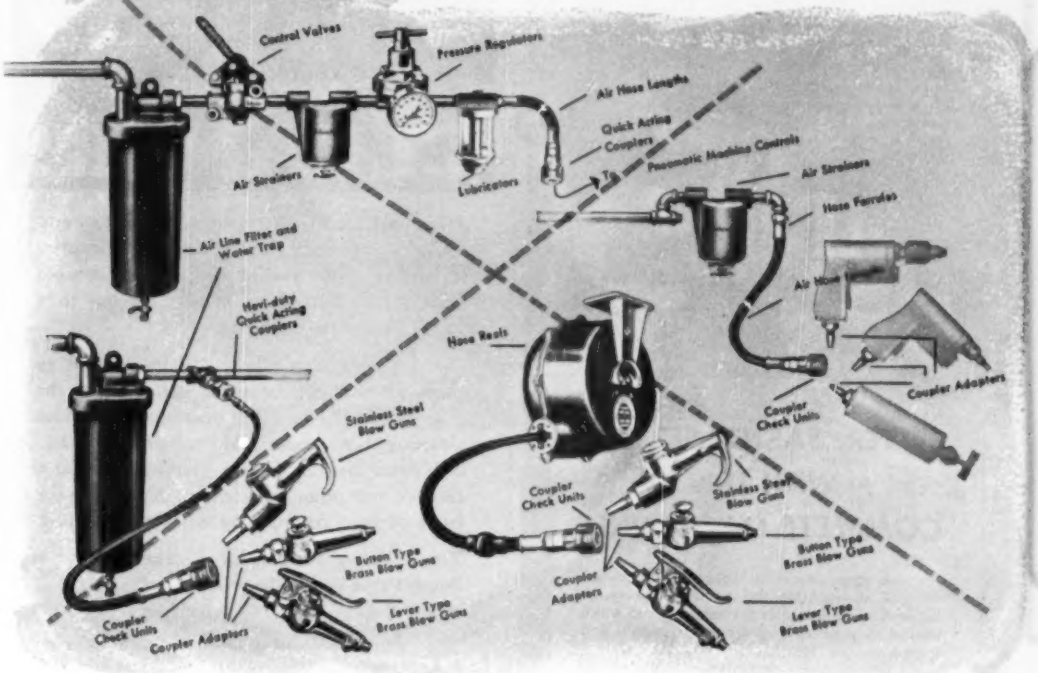
MADISON MANUFACTURING CO.

DEPT. AM **MUSKEGON, MICHIGAN**

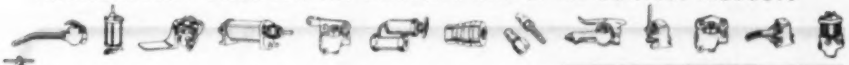
Everything for the air line from the wall to the end of the air hose.....

Start with, improve with, replace with genuine Schrader Air Control Products

Regardless of the kind of air system you now have or whether you are planning to expand the use of compressed air in your operations . . . you owe it to yourself to see Schrader now! It's the most modern line—with many new types of controls, the complete line—with practically everything you can think of, every product planned to increase production, save air, reduce maintenance, and eliminate air losses. And it's backed by Schrader factory representatives and the nation's finest distributors—ready to help you. Send in the coupon . . . today!



ALWAYS SPECIFY SCHRADER, THE COMPLETE LINE OF AIR CONTROL PRODUCTS



Schrader
PRODUCTS CONTROL THE AIR

5 MAIL THIS COUPON TODAY

A. SCHRADER'S SON, 490 Vanderbilt Ave., Brooklyn 17, N. Y.
Division of Scovill Manufacturing Company, Incorporated

Please send me information and free literature about the products I have checked in the squares at the right.

NAME_____

COMPANY_____

ADDRESS_____

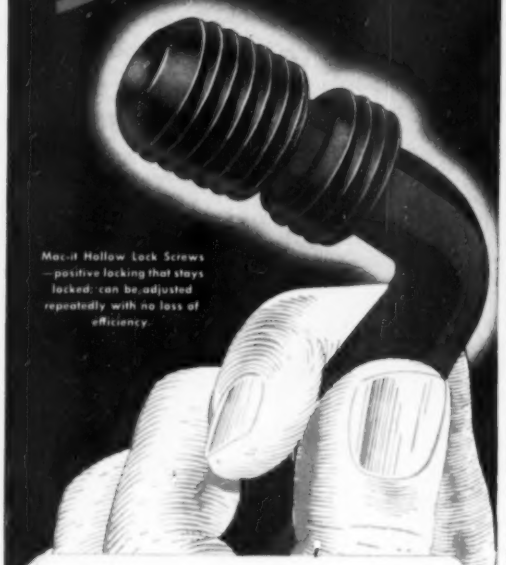
CITY_____ ZONE____ STATE_____

Check Here	
Air Cylinders	☐
Operating Valves	☐
Press & Shear Controls	☐
Air Ejection Sets	☐
Blow Guns	☐
Air Line Couplers	☐
Air Hose & Fittings	☐
Hose Reels	☐
Hydraulic Gauges	☐
Pressure Regulators & Oilers	☐
Air Strainers	☐
Uniflare Tube Fittings	☐

IT'S A

Mac-it ®

PRONOUNCED "MACK-IT"



Mac-it Hollow Lock Screws —positive locking that stays locked: can be adjusted repeatedly with no loss of efficiency.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first*.

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Socket Head Cap Screws
Hollow Set Screws
Stripper Bolts
Hollow Pipe Plugs
Socket Screw Keys
Square Head Set Screws
Hexagon Head Cap Screws
. . . and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY
Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Emsworth, Pa.

costs more yet saves you money

try a PARCO *formulated* CLEANER!

A Parco Cleaner costs you more per pound than your present metal cleaner. Yet cleaning economy—actual money savings—is reported from plant after plant, after changing to a Parco *Formulated* Cleaner.

Parco Cleaners are specially formulated to clean and condition metal surfaces for the next step in the finishing operation, to reduce cleaning time, operating temperatures and concentration of cleaner used. Surface area cleaned per pound of cleaner material is the basis of cost comparison of metal cleaning.

Try a Parco *Formulated* Cleaner. See if it doesn't save money for you, too.

- **Emulsion and Solvent Type**—Spray and immersion cleaners for removing oil, grease and soil from metal surfaces.
- **Acid Type**—Four cleaners for quick, effective removal of rust and scale from iron and steel.
- **Alkaline Type**—Light and heavy duty spray and immersion cleaners. For removal of oil, grease and soil from metal surfaces.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

Parker **RUST PROOF COMPANY**
2196 E. Milwaukee Ave.,
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • **PARCO COMPOUND**—Rust Resistant
PARCO LUBRITE—Wear Resistant for Friction Surfaces

CUT INSPECTION TIME

ON INTERNALLY THREADED PARTS

IN HALF

Real time saver is this new power-driven thread gaging handle. In many places it has multiplied by two or three or even more – – the inspection output per hour of internally threaded parts. Furthermore, it materially reduces operator fatigue.

Manual rotation of the gaging member is completely eliminated. Action is automatic. A slight forward pressure screws the gaging member into the work at *four revolutions per second.* A slight reversal in the applied pressure causes *immediate disengagement of the drive,* or withdrawal of the gage, as desired. A handle is provided at the top of the unit for ready portability to bench or machine.

Write today for more information on this new way of cutting inspection costs on threaded parts. You'll find it pays. The Taft-Peirce Manufacturing Company, Woonsocket, R. I.

T-P means TOP PRECISION

NO, SIR!
The Seal Won't Blow!

METALLIC-BACKED neoprene seals are used in this famous bearing—and they are engineered to *stay put*. They can't blow.

Your lubricant stays in; dust and dirt stay out; the result is years and years of trouble-free performance.

The "SC" Bearing is a new member of the Dodge 30,000 hour line. Modern styling. Rugged one-piece cast iron housing. Long inner race. Radial and thrust load capacity. Fully self aligning. *WRITE* for special "SC" bulletin, giving complete specifications.

DODGE MANUFACTURING CORPORATION, 100 Union St., Mishawaka, Ind.

DODGE TYPE "SC" BALL BEARING PILLOW BLOCK

Precision built bearing for small shafts and moderate loads. Pillow blocks, flange bearings and hanger bearings available from distributors' stocks in shaft sizes ranging from 3/4" to 2-7/16".

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained, he can give you valuable assistance on new, cost saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone book.

DODGE

of Mishawaka, Ind.

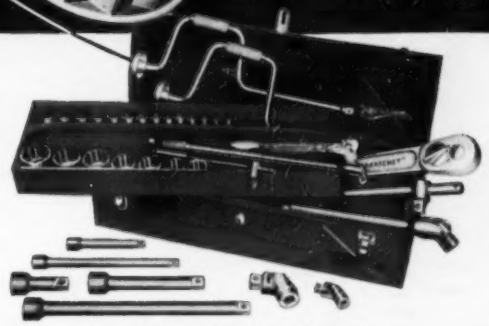
FIRST IN POWER TRANSMISSION MACHINERY

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS

WILLIAMS SUPERSOCKETS

WORLD'S MOST FLEXIBLE WRENCH SYSTEM The engineered flexibility of Williams "Supersockets" permits the combining of sockets, handles and accessories to create special wrenches for special jobs. Available in five different patterns, with drives ranging from 1/4" to 1" square, and with socket openings from 3/16" to 3-1/8". Write for Williams "Supersocket" Catalog A-50.



Set No. S-10 Complete in Metal Case, 36 Pieces
21 Sockets and 15 attachments

WILLIAMS

• OUR DISTRIBUTOR IS YOUR LOCAL WAREHOUSE

OPEN END, BOX, ADJUSTABLE & RATCHET WRENCHES; DETACHABLE SOCKETS & SETS; IMPACT SOCKETS; TOOL HOLDERS; LATHE DOGS; "C" CLAMPS; CHAIN PIPE TONGS & VISES; FLANGE JACKS; PLIERS; SCREWDRIVERS; PUNCHES & CHISELS; SOFT FACED "NUPLAFLEX" TIPPED HAMMERS; HOIST HOOKS; EYE BOLTS; ROD ENDS; CRANK & BALANCE HANDLES; THUMB SCREWS & NUTS

J. H. WILLIAMS & CO., BUFFALO 7, N. Y. *Distributors Everywhere*

LET
EX-CELL-O
PRODUCE YOUR
PRECISION PARTS
AND SUB-ASSEMBLIES

Having trouble holding close tolerances on production parts? Are precision sub-assemblies a bottleneck? Ex-Cell-O has the know-how that will lick these problems and keep parts or sub-assemblies flowing to your plant in just the quantities you need. Ex-Cell-O has very complete parts production facilities, and being one of the largest precision machine tool manufacturers, can work out the most practical processing with both standard and special production equipment. Call your local Ex-Cell-O representative, or send a part print to Ex-Cell-O in Detroit for a quotation.

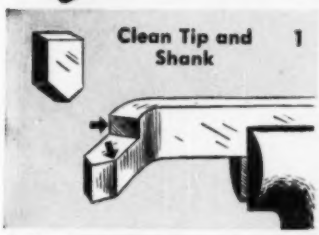
EX-CELL-O CORPORATION

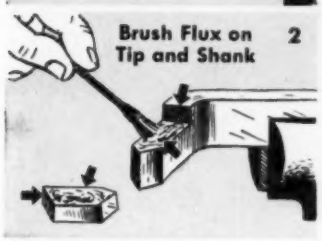
DETROIT 32
MICHIGAN

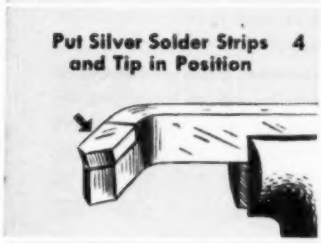
MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS
DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

HOW TO MAKE YOUR OWN TIPPED CUTTING TOOLS

The sketches below show how easy it is to make your own tools by silver brazing HAYNES STELLITE tool tips to steel shanks. There are 14 standard shapes of these tips stocked for immediate delivery. Write for a copy of "HAYNES STELLITE Metal Cutting Tools" which illustrates the sizes and types of tool tips available (use the convenient coupon below). You will find prices considerably lower than for solid or welded tip tools.







1. Clean both the tip and the recessed area of the steel shank by light grinding if necessary—then brush with carbon tetrachloride. Clamp shank in vise with bottom surface of recess level.

2. Brush silver-brazing flux generously onto the joint surfaces of both tip and shank.

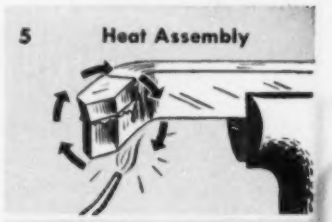
3. From 0.003-in. thick silver solder strip cut pieces slightly over-size for the joint faces of the recess.

4. Position the brazing alloy strips and place the fluxed tip in the shank recess ready for heating.

5. Use an oxy-acetylene blowpipe with a reasonably large tip and adjust for a reducing flame. Heat the shank underneath the tip to a cherry red, rotating the flame from bottom to side to top to other side to bottom. (For large quantities of tools, you can do this heating in a furnace at approximately 1450 deg. F.)

6. When the silver alloy melts, move the tip with a rod or tongs into exact position, and then press it just enough to squeeze out excess flux and silver solder. Allow the assembly to air-cool. *Do not quench!*

7. When the assembly is completely cool, remove the excess flux and scale. The tool is now ready for grinding.



WRITE FOR YOUR FREE COPY TODAY

HAYNES *Alloys*

Haynes Stellite Division
Union Carbide and Carbon Corporation

UCC

The trade-marks "Haynes" and "Haynes Stellite" distinguish products of Union Carbide and Carbon Corporation.

USE THIS HANDY COUPON

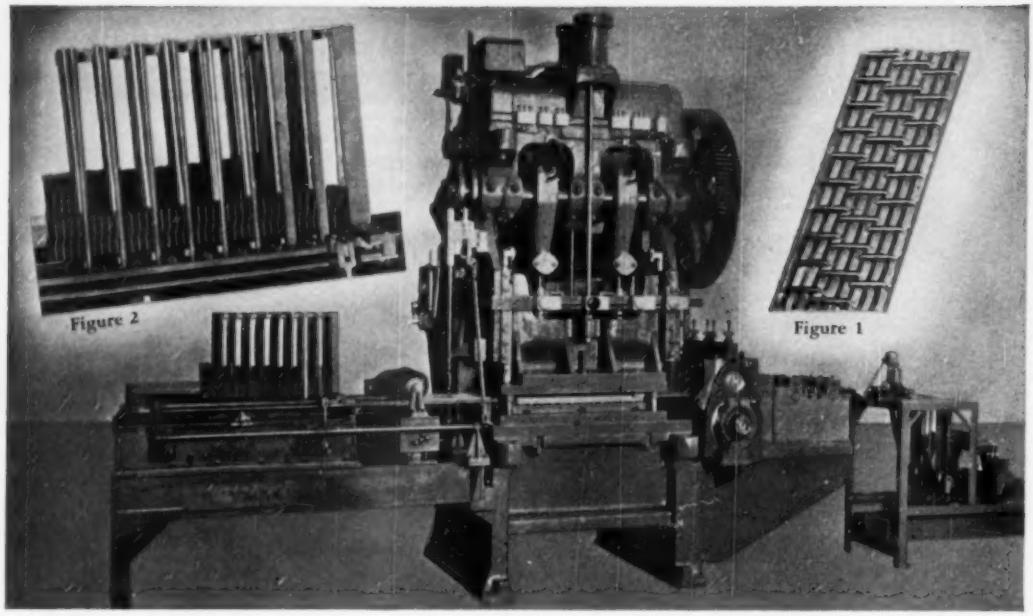
Haynes Stellite Division, 727 S. Lindsay Street, Kokomo, Ind.

Please send me, without obligation, your booklet, "HAYNES STELLITE Metal-Cutting Tools."

NAME_____

COMPANY_____

ADDRESS_____



CLEVELAND press *stacks up* 120 fins a minute

120 automobile radiator fins are stacked up per minute as raw metal is uncoiled, corrugated, punched and sheared *automatically* by a leading automotive parts manufacturer using this new Cleveland Press fabricating unit.

Two strips of metal are pulled through the beading and corrugating coils by automatic coil feed. Then they are fed into the Press, which is single geared and equipped with a single station electrically controlled Cleveland Drum Type Friction Clutch. Here they are punched and sheared to length as in Figure 1. Rotating brushes pass the completed fins to the stacker where they are collected in two piles (see Figure 2).

Selecting the right press from Clevelands' wide variety of sizes and types was easy. The tough problem was how to stack the rough surfaced fins. Cleveland engineering ingenuity solved this by stacking *from the bottom* while the load is held in a raised position by a set of elevator fingers. Finished stacks can be readily removed without disturbing press operation.

If you have a production problem demanding greater press efficiency, be sure to investigate the Cleveland line. One of the many sizes and types available will undoubtedly meet your requirements. Cleveland engineers will gladly work with you on special problems.

A-2716

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

PUNCHING TOOLS & DIES

FABRICATING TOOLS

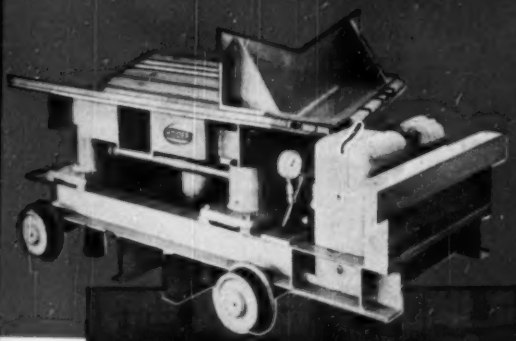
OFFICES AT:
NEW YORK.... CHICAGO
DETROIT.... PHILADELPHIA
PITTSBURGH

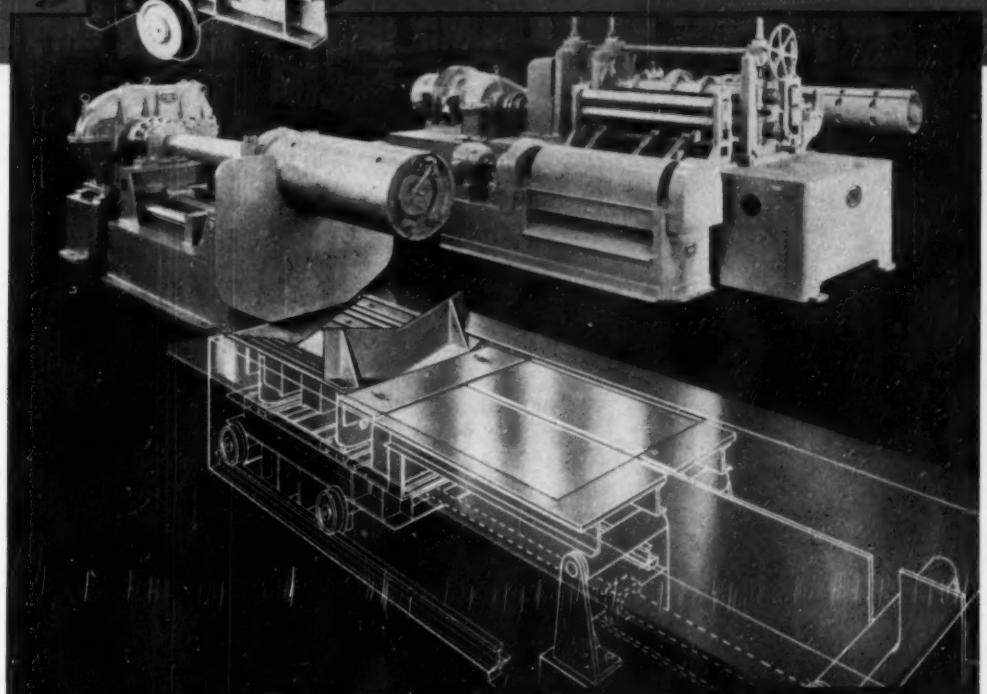
Established 1880

• • • • • POWER PRESSES • • • • •

CLEVELAND 14, OHIO

YODER COIL CARS





—step up Slitter production by 50% to 100%

Where greater slitter production is needed, instead of buying a new slitting line, you may be much better off by installing one or two Yoder Hydraulic Coil Cars of the latest, most efficient design. By saving time in loading the Uncoiler, unloading the Recoiler, and doing the banding elsewhere in the shop, coil cars are often the most economical means of increasing production and reducing cost.

Typically, 16 minutes per coil often spent on the operations just mentioned may be reduced to two or three minutes, reducing the cycle time from 25% to 50%.

The use of Coil Cars and other means of saving time and money in slitter operations are discussed in the new Yoder 76-page book on Slitting Lines and their Operation—yours for the asking.

Whether your requirements in slit strands are small or large, you will find the time studies and other information in this book of more than ordinary interest.

THE YODER COMPANY
5519 Walworth Avenue • Cleveland 2, Ohio

Complete Production Lines

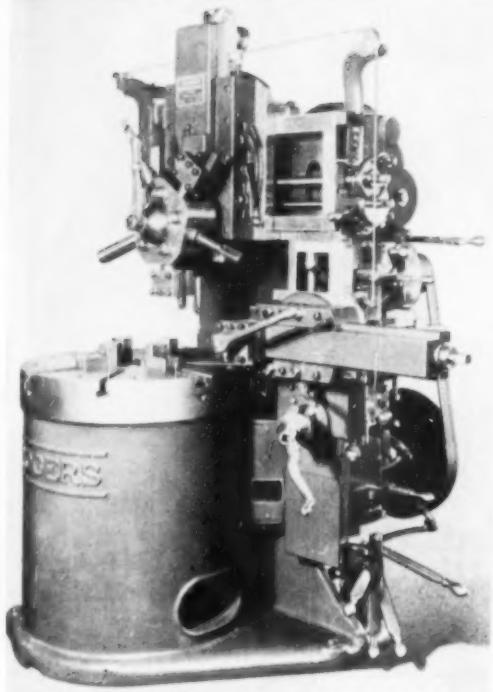
- ★ **COLD-ROLL-FORMING and auxiliary machinery**
- ★ **GANG SLITTING LINES for Coils and Sheets**
- ★ **PIPE and TUBE MILLS—cold forming and welding**

ENGINEERING YODER MANUFACTURING

ROGERS

"Perfect 36"

VERTICAL TURRET MILLS



Only $6850.00

SAME LOW PRICE SINCE 1942

Simplicity of Rogers design and operation makes the chips fly faster when

BORING **DRILLING**
TURNING **THREADING**

ferrous and non-ferrous castings and forgings.

Rogers Mills that were built over 50 years ago are still in operation—proof of the high quality of workmanship, material and rugged design.

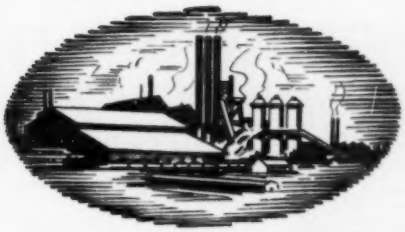
Low priced, versatile, precision **Rogers Mills pay for themselves on production lines and in maintenance departments. "*Compare*" by writing for fully-illustrated Catalog TODAY.**

ROGERS

MACHINE WORKS

1801 ELMWOOD AVENUE · BUFFALO 7, N. Y.

Knowing How Since 1885



1900 ★ THE MIRACLE OF AMERICA ★ 1950

Freedom and Progress

It's no stretch of the imagination, rather, robust realism to call our past half century a Miracle—U. S. A.

America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and teletype . . . and to atomic energy and its untold potentialities.

- Since 1900 we have increased our supply of machine power 4½ times.
- Since 1900 we have more than doubled the output each of us produces for every hour we work.
- Since 1900 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power), yet . . .
- Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

THIS IS THE MIRACLE OF AMERICA . . . it's only beginning to unfold.

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL ·

Published in the public interest by:

McGraw-Hill Publications

Enduring Precision

This spindle bearing is standard equipment on large spindles designed by a world-famous builder of precision grinders. For extreme accuracy, for freedom from vibration, and for enduring precision, only sleeve bearings will do. Where other types of bearing retain their accuracy only for months, Bunting Spindle Bearings endure for years. Where other complex types require a surgical standard of cleanliness and a watchmaker's skill for replacement, the Bunting Sleeve Bearing requires only common-sense and the services of a good mechanic.

The secret of this performance and long life lies in the film type of lubrication. A properly designed and well lubricated sleeve bearing need not acknowledge any superior. No other bearing type possesses its simplicity, its ruggedness, its ability to deliver accurate work for many years. These attributes are possessed by the sleeve bearing.

Bunting engineers are at your service whether your problem is a precision grinder spindle, an aircraft engine, an automobile engine, or something of more or of less exacting requirements. Bunting engineers utilize their extensive experience with bearings of all types in their work of designing Bunting Cast Bronze Sleeve Bearings. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

Bunting

BRONZE BEARINGS

PRECISION BRONZE BARS

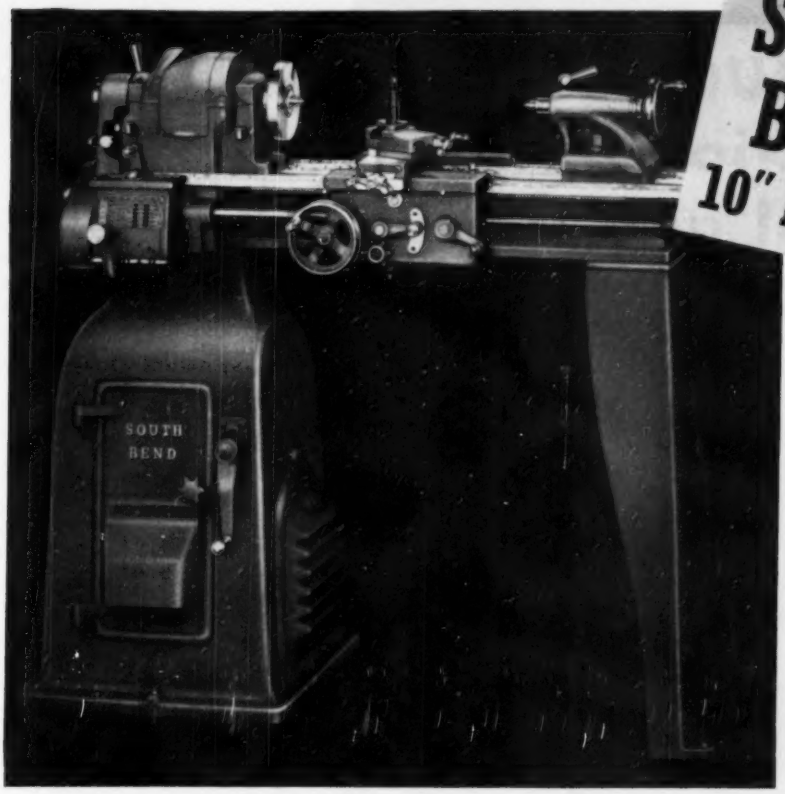
BUSHINGS

76

10" x 3-1/2', 1" Collet, Quick Change Gear Lathe with 3/4 h.p., 3 phase, 60 cycle, 220 volt motor and switch; f. o. b. factory **$941.35**

Time Payments: $235.35 down payment, $62.36 for 12 months.

SOUTH BEND 10" LATHES



Keep Machining Costs Down

If you are machining small parts to close tolerances, there is a good possibility that South Bend 10" Lathes can help you keep machining costs down.

This is the type of work that they do best. Their accuracy simplifies holding exact tolerances on any operation. Smooth finishes, that often eliminate subsequent operations, result from the vibration-free drive and large bearing areas. They are economical of manpower — handling is simplified, fast and nearly effortless. You will also find that their versatility keeps them busy . . . they are highly adaptable to a wide variety of jobs.

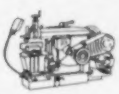
It's costly to use over-sized and over-powered lathes for your small, precision parts. It will pay you to find out about South Bend 10" Lathes. *Write now.*

SOUTH BEND LATHE

Building Better Tools Since 1906

SOUTH BEND, INDIANA

Send for Information — **Check Machine Tools You Are Interested In**



☐ BENCH LATHES 9" and 10" ☐ TURRET LATHES ½" and 1" Collets ☐ 7" BENCH SHAPERS ☐ 14" DRILL PRESSES

☐ PRECISION LATHES 10", 13", 14½", 16", 16/24" ☐ LATHE TOOLS and ATTACHMENTS ☐ TIME PAYMENT PLAN

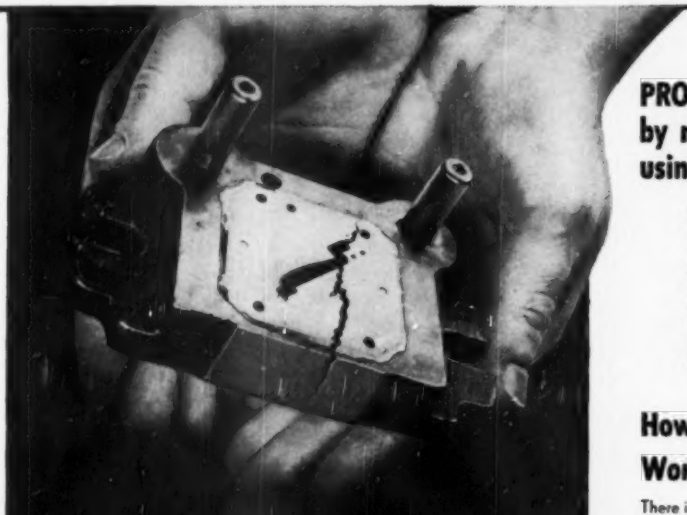
Name_____

Street_____

City_____ Zone_____

State_____

How *MUCH* of your Production Dollar is *WASTED* By Tool and Die *BREAKAGE?*



IT CAN'T HAPPEN with PROTECTRON

PROTECTRON prevents tool and die breakage

PROTECTRON lengthens tool life up to 300%

PROTECTRON cuts costly "down-time"

PROTECTRON senses oversized or overhard stock, "pileups", and tool dullness. Automatically trips the machine at the slightest mechanical overload from whatever cause before damage occurs.

The Brinnell Company

GRANBY, CONN.

PROTECTRON hailed by manufacturers using

- Automatic presses
- Eyelet machines
- Milling machines
- Automatic screw machines
- Conveyor systems
- Conveyorized machinery
- Drilling machines
- Mixers and agitators
- Broaching machines
- Packaging machines
- Special machinery

How PROTECTRON Works

There is only one PROTECTRON, the one device which successfully senses minute increases in mechanical load and automatically trips the machinery at any preset degree above normal.

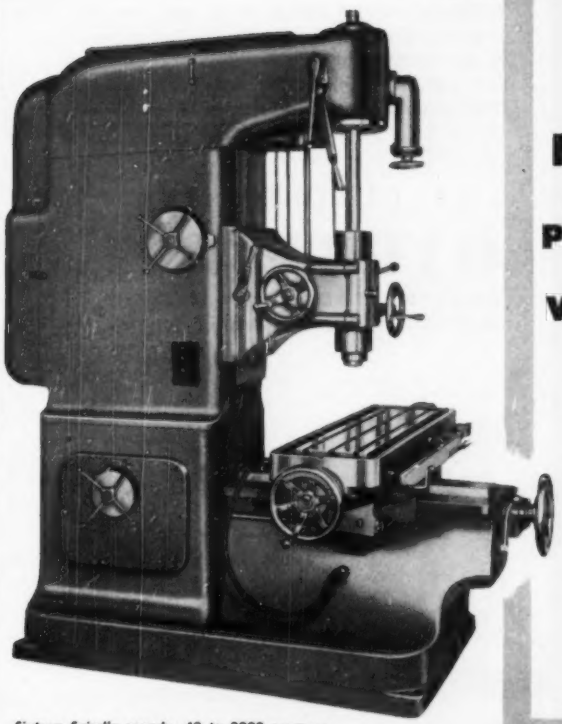
PROTECTRON can be adjusted to such a fine degree of sensitivity that a 50 ton punch press is instantly stopped by holding a rag against the rim of its flywheel.

No single device can save you so much — so quickly — at so little cost.

Write, wire or phone for a demonstration in your own plant.

1 machine that does the work of 2!

- Cuts setup time in half
- Eliminates work transfers
- Increases output, reduces costs



Sixteen Spindle speeds, 40 to 2000 r.p.m.—9 Spindle feeds, .005" to .010"—100" table traverse per minute in both directions—16 Table feeds, 5/16" to 20" per minute

KNIGHT NO. 50 FOR PRECISION BORING AND VERTICAL MILLING

- Handles an extreme range of difficult precision work usually done on two or more machines
- Provides exceptional cross table travel plus extra long spindle travel
- Complete selection of spindle and table speeds and feeds
- Rugged, rigid bed-type construction for positive accuracy on heaviest work
- All-gear 7½ H.P. drive — Plenty of power for large, tough jobs
- Simple, convenient controls — easy setup—clear vision—all reduce job time

ATTACH TO COMPANY LETTERHEAD

Mail Coupon Now

FOR COMPLETE DETAILS

W. B. KNIGHT MACHINERY CO., 3920 West Pine, St. Louis 8, Mo.

We would like to have your catalog on the No. 50 and other Knight Milling Machines.

Name_____

Title_____

W.B.KNIGHT
MACHINERY COMPANY

3920 WEST PINE BLVD. ST. LOUIS 8, MISSOURI

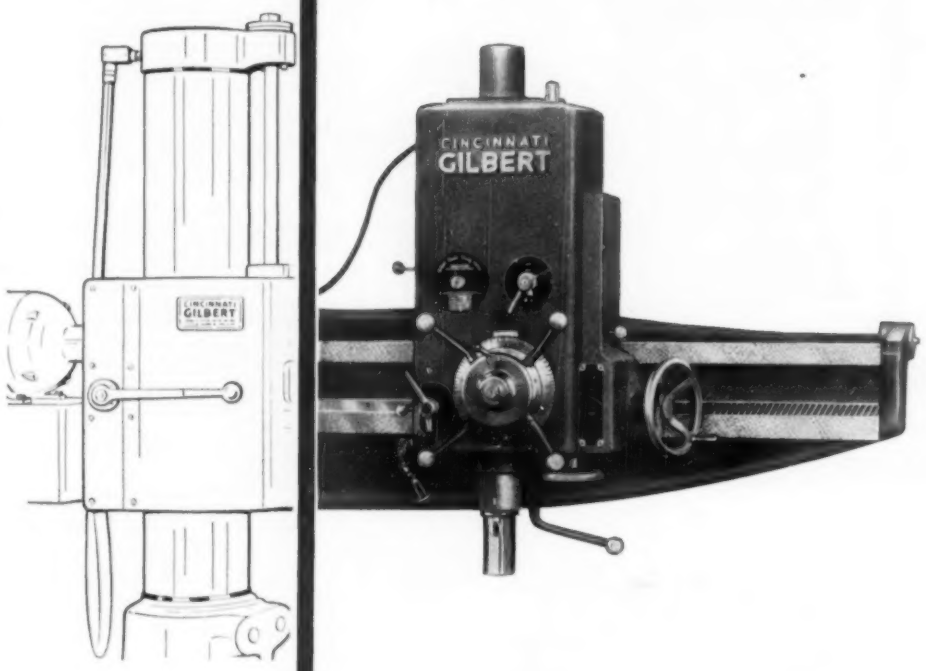
KNIGHT VERSATILE MILLING MACHINES

MORE GOODS for MORE PEOPLE at LOWER COST

those who buy Gilbert buy Gilbert again

The new head on Gilbert 9″ and 11″ radials is the latest of many forward steps that have kept Gilbert users coming back for more. The controls are arranged for utmost convenience, give the operator instant response, save valuable minutes every hour—help get more work out right, and on time . . . Operators appreciate too, the heft and balance of the new Gilbert arm, which cuts vibration way down even on heavy work at the extreme end . . . Get the full story on the 12 new design and construction improvements that make Gilbert multi-duty radials better buys than ever. Write for new bulletin No. 349, or better still call in your Gilbert engineering representative.
The Cincinnati Gilbert Machine Tool Company,
3360 Beekman Street, Cincinnati 23, Ohio.

THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
RADIALS • HORIZONTAL BORING MILLS • ACCESSORIES



THOSE WHO BUY GILBERT BUY GILBERT AGAIN

FREE LITERATURE

New Catalogs, Booklets Bulletins

MACHINES AND ATTACHMENTS

1 MILLING MACHINES — *Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio.* 47-page catalog M-1684 covers machines for milling, broaching, cutter sharpening, grinding, lapping, and flame-hardening. Machines and parts are illustrated and specifications and highlights are given. Cutting fluids are also discussed.

2 SHAPERS — *The Cincinnati Shaper Co., Cincinnati 25, Ohio.* 32-page catalog N5 illustrates, describes, and reviews applications of the company's line of shapers. Tables of dimensions and specifications for various size machines are provided.

3 DRILLING MACHINERY—*The Avey Drilling Machine Co., Cincinnati 1, Ohio.* 24-page bulletin 50 describes and illustrates cam-feed drilling and tapping units, hydraulic drilling units, deep-hole drilling units, automatic index tables, way-type drilling and tapping machines, and standard drilling and tapping machines.

4 CYLINDRICAL GRINDER — *Landis Tool Co., Waynesboro, Pa.* 23-page catalog 1-49 offers a complete description including illustrations of key parts of a 12-in. universal hydraulic cylindrical grinder. Applications of this machine are also illustrated.

5 PRESSES—*The Minster Machine Co., Minster, Ohio.* 11-page catalog No. 149 illustrates and describes 15 automatic production presses.

6 DRILLPRESSES — *Atlas Press Co., Kalamazoo, Mich.* 12-page catalog D-50 covers both floor- and bench-type drillpresses as well as parts and accessories. Tables of engineering data and illustrations are included.

7 PRESSES—*The Federal Machine and Welder Co., Warren, Ohio.* 8-page illustrated bulletin entitled "Inclinable Presses" presents a line of high-speed precision production inclinable presses and discusses the needs of press users. Open-back units range in size from 40- to 200-ton capacity with stroke lengths made to suit customer's requirements.

8 PUNCH PRESSES—*Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif.* 8-page catalog describes the Model 30-48 30-ton double-crank punch press. An illustrated description of the shearing-die attachment for the press, and punch press specifications are also presented.

9 LAPPING MACHINE — *The Taft-Peirce Mfg. Co., Woonsocket, R. I.* 4-page illustrated folder presents the company's 24-in. lapping machine. Accessories, including adjustable holding fixtures, resurfacing block, and abrasive lapping compound, are discussed on the back page of the folder.

10 SHEET CUTTING MACHINE — *American Pullmax Co., Inc., 2627 Northwestern Ave., Chicago 47, Ill.* 6-page folder describes line of plate and sheet cutting machines. Seven different sizes are illustrated and described. The largest model works mild steel up to 11/32 in.

11 PRECISION MACHINES—*Hardinge Bros. & Co., Elmira, N. Y.* 4-page bulletin SMP presents four high-speed precision machines for screw-machine product manufacturers. High-speed chucking machine with 13-in. swing is also covered. Folder is liberally illustrated.

12 PLASTICS MOLDING PRESS — *F. J. Stokes Machine Co., Philadelphia, Pa.* 4-page folder 501 describes in detail the Model 723, 200-ton plastics molding press. Illustrations of the press and specifications are included.

13 PRESSES — *Verson Allsteel Press Co., 9316 S. Kenwood Ave., Chicago 19, Ill.* 4-page bulletin OBI-49 gives design features and specifications for an expanded line of open-back inclinable presses which range from 90- to 250-ton capacity.

TOOLS AND ACCESSORIES

14 GRINDING — *Allis-Chalmers, Milwaukee, Wis.* 32-page grinding-standards booklet covers portable, stand, tool, surface, external cylindrical, internal and centerless grinders, as well as mounted points and cut-off wheels. Responsibilities of the purchasing department, safety organization, foremen, tool crib attendants, maintenance department, and employees, in connection with grinding tools, are listed.

15 INTERNAL GRINDING SPINDLES — *Pope Machinery Corp., Haverhill, Mass.* 72-page catalog No. 57 is said to help make quick, accurate, selection of the correct internal-grinding spindle for any given application. Illustrations and dimensional data are indexed for ready location by type of spindle, make of grinding machine, or by style numbers.

16 REAMERS—*Wendt-Sonis Co., Hannibal, Mo.* 17-x11-in. reaming-instruction wall chart provides a table of general re-sharpening directions and another of suggested feeds, speeds and stock removal. Information is also given on how to eliminate chatter, coolants and lubricants to use, and how to reduce reamer size.

17 MEASURING MACHINE—*Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn.* 8-page circular 323 presents a detailed illustrated description of the company's standard measuring machine. The unit is equipped with both English and metric scales. Complete specifications are listed.

18 GRINDING TOOLS—*The Metal Removal Co., 1014 N. Ashland Ave., Chicago 22, Ill.* 8-page catalog No. 20 shows shapes of a wide variety of carbide burs, high-speed steel cutters, mandrels, mounted wheels, abrasive cartridges and polishing wheels. It also illustrates and describes three portable grinders.

19 THREADING TOOLS — *The Toledo Pipe Threading Machine Co., 1425-1445 Summit St., Toledo 4, Ohio.* 52-page illustrated booklet called "This Is Toledo" describes pipe tools, pipe machines, power drives, pipe reamers, pipe vises, and threading oil. Both complete descriptions and pictures of equipment in use are presented.

20 BROACHES AND CUTTING TOOLS—*Ex-Cell-O Corp., Detroit 32, Mich.* 136-page fully-illustrated tool catalog lists and describes all Continental standard cutting tools, both carbide and high-speed steel. It contains a complete broach and fixture section with drawings and photographs. A cross-index reference simplifies the tool listings for both standard and special tools.

21 BEARING LUBRICATION — *Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa.* Booklet B-6378 presents facts about the pre-lubricated bearings used in Life-Line motors. It includes sections devoted to desirable qualities of grease, tests for adequacy of grease, and tests for seal effectiveness. Several case histories are included.

22 CUTTING TOOL—*Nelco Tool Co. Inc., Manchester Conn.* Catalog of carbide-tipped cutting tools pictures, describes, and lists wide selection of sizes of side milling cutters, face mills, shell mills, end mills, half-side mills, keyseat cutters, fluted end mills, carbide-tipped twist drills, masonry drills, drills for hard steel, slash-milled tool-bits, and a variety of special tools.

Example

Name John Roderick
Title Supt.
Company W.C. Dorf Mfg. Co.
Co. Address 601 North St.
Brooklyn, N.Y.
Fill in below number of ONE catalog wanted: 32
AMERICAN MACHINIST, New York

How to Order

1. If you are requesting four pieces or less, please use only the bottom card.
2. Be sure to fill one space for each booklet.
3. When you have filled out one card, detach, stamp and mail.

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
Fill in below number of ONE catalog wanted:
Not good after May 1, 1950

FREE LITERATURE

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

23 LEAK DETECTOR — *Consolidated Engineering Corp., 620 N. Lake Ave., Pasadena 4, Calif.* 16-page illustrated bulletin covers the Model 24-101 leak detector, a highly sensitive instrument for detecting and locating leaks in vacuum or pressure systems.

24 ABRASIVE BELTS—*Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.* 32-page booklet entitled "Step Up Production" presents 16 illustrated applications, complete with technical data, of abrasive belts for grinding and polishing. Techniques are described and pictured, for operations on carbon and stainless-steel sheets, steel tubing and bars and other materials.

25 GRINDING POLISHING BELTS—*Behr-Manning Corp., Div. of Norton Co., Troy, N. Y.* 8-page booklet provides diagrams and illustrations of applications for metallic-cloth belts for backstands grinding and polishing of metals.

26 VIBRATION ABSORBERS — *Korfund Co. Inc., 48-39-B 32nd Place, Long Island City 1, N. Y.* 4-page catalog ER-701 describes and illustrates a wide variety of applications of a low-cost cork and rubber mounting material, requiring no molding or cementing, which absorbs machine vibrations.

HEAT-TREATING AND WELDING

27 WELDING POSITIONER—*Aronson Machine Co., Arcade, N. Y.* 2-page folder gives a completely illustrated description of a 300-lb capacity automatic welding positioner. The unit provides infinitely variable work rotation speeds for circular welding with a minimum of tooling required.

28 TANK HEATING — *Kold-Hold Mfg. Co., Lansing, Mich.* Six-page bulletin describes and illustrates this company's method of tank heating and cooling. A direct comparison is made between the Platecoil and pipe coil methods of heat exchange.

29 COMBUSTION CONTROL — *Selas Corp. of America, Philadelphia 34, Pa.* 10-page bulletin SC-2.1 presents a comprehensive discussion of a line of combustion controllers including uses, design and construction, capacities and pressures, procedure in controller selection, and compensation for variations in temperature and gas analyses. Illustrations, tables, and charts are included.

PLANT SERVICE EQUIPMENT

30 HYDRAULIC PUMPS — *Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.* 48-page catalog 4900 presents illustrations, specifications, diagrams, and descriptions of pumps, pressure controls, volume controls, directional controls, control assemblies, hydraulic motors, transmissions, and cylinders.

31 GRAVITY CONVEYORS—*The Wolbis Co., 5520 Arch St., Philadelphia 39, Pa.* 10-page booklet includes drawings and descriptions of the company's wheel, roller, and chute gravity conveyors. Uses, selection, and construction of the conveyors are discussed.

32 ELECTRIC BLOWERS — *Buffalo Forge Co., Buffalo 5, N. Y.* 8-page bulletin 3014-D covers two of the company's line of electric blowers and exhausters. Performance charts and tables of capacities are provided. Capacities range from 30 to 500 cfm. Engineering drawings are included.

33 LIFT TRUCK — *Hyster Co., 2902 North East Clackamas St., Portland 8, Oregon.* 8-page catalog shows model views and action photographs of a 2000-lb capacity lift truck. A description, including specifications, is given as well as illustrations of seven other models.

34 FLOOR SURFACES — *West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.* 32-page booklet entitled "Proper Care of Floors" discusses all types of floor surfaces, new and old, and the proper methods of maintenance. A two-page floor preservation chart lists types of surfaces, proper cleanser, sealer, and maintainer to be used. Cleaning, sealing, and maintaining processes are also suggested.

35 MATERIALS HANDLING — *Aervel Co. Inc., 2820 Ontario St., Burbank, Calif.* Materials handling manual offering "355 ways to cut inventories" includes complete illustrations of companies, products, and drawings, showing how they solved particular materials handling problems. Dimensions, load ratings, and code numbers are tabulated for quick reference.

PARTS AND MATERIALS

36 SPEED ADJUSTMENT — *General Electric, Schenectady 5, N. Y.* Series of five publications on adjustable speed includes a 24-page booklet presenting a summary of benefits which industry can expect from properly applied adjustable speed; an eight-page booklet on adjustable speed ACA motors; a 10-page booklet on speed variators; an eight-page booklet on electronic speed variators; and a 20-page booklet on Thy-Mo-Trol adjustable speed drives.

37 SCREWS AND WASHERS—*Parell Mfg. Co., 5700 Roosevelt Road, Chicago 50, Ill.* 28-page illustrated booklet describes a line of lock-washer screws. Screws in round, pan, truss, fillister, flat, and oval head styles are illustrated.

38 SPEED REDUCERS—*The Cleveland Worm and Gear Co., 3288 E. 80th St., Cleveland 4, Ohio.* 8-page bulletin 125 describes two vertical speed reducers. Illustrations, dimensional drawings, and performance charts are presented.

39 BUSHINGS AND BEARINGS — *Johnson Bronze Co., New Castle, Pa.* 83-page industrial-bearing catalog presents engineering data and order numbers for company's entire line of bushings, bearings, bar bronze, and babbitt. Illustrations of bearing are provided.

40 BALL BEARINGS—*New Hampshire Ball Bearings, Inc., Peterborough 1, N. H.* 12-page technical bulletin No. 50 describes a full line of standard and special ball bearings including Conrad radial, full-race radial, extra-light radial, angular-contact, self-aligning, and pivot-design bearings. Outside diameters range from ⅝ to ⅜ in.

41 FITTINGS—*Spun Brass Mfg. Co., Otsego, Mich.* 18-page catalog SB-10-49 illustrates and lists prices for various sized flared, compression, and special fittings, and copper tube assemblies.

42 BALL BEARINGS—*New Departure, Div. General Motors Corp., Bristol, Conn.* 16-page illustrated booklet entitled "Lubricated-for-Life Ball Bearings for Conveyor Systems" describes a wide variety of conveyor-system ball bearings, illustrating applications. Engineering drawings of the various types of bearings as well as cut-away illustrations are presented.

43 SHIMS, LOCKNUTS, STAMPINGS —*Laminated Shim Co., Inc., 71 Union St., Glenbrook, Conn.* 8-page booklet demonstrates with pictures and captions how to apply shims and lock nuts. The text material tells when and where shims and locknuts of various designs should be applied.

MISCELLANEOUS

44 STEEL CASTINGS—*Steel Founders Society of America, 920 Midland Bldg., Cleveland 15, Ohio.* 34-page illustrated booklet traces the history of the steel casting industry and presents pictures of complicated castings used in various industries today.

45 HYDRAULIC TABLES—*The Baldwin Locomotive Works, Philadelphia 42, Pa.* 36-page bulletin No. 300 is intended for designers and users of hydraulic equipment, particularly for load-producing purposes. It discusses capacities of hydraulic rams, displacements of single-acting plungers, friction losses of fittings, includes steel pipe tables, and water flow rates, gives bolt strength and size data, and tells how to determine when to use accumulators, pumps, intensifiers, and shock valves.

46 HIGH-SPEED STEEL — *Allegheny Ludlum Steel Corp., Pittsburgh, Pa.* 16-page booklet titled "The Working of Tool and High-Speed Steels" gives information summarized from laboratory and service tests on various grades of the company's steel. The booklet includes a simple tool-steel selector chart and discussions on design, machining, cutting tool angles, speeds, heat-treats, and grinding.

47 FLOORING MATERIAL—*The Master Builders Co., Cleveland, Ohio.* 36-page illustrated booklet gives full information on the product and method which produces the nine features in this company's flooring, said to be most important in industrial, commercial, and institutional floors. Illustrated directions for laying the flooring are given.

48 VISUAL SAFETY—*American Optical Co., Southbridge, Mass.* 12-page vest-pocket booklet offers suggestions for initiating and conducting a program for protecting employees' eyes from injury and for improving their visual efficiency and comfort.

49 *STEEL—Jones & Laughlin Steel Corp., Pittsburgh 30, Pa.* 32-page brochure called "The Transportation Steel" describes Oitecoloy, a low-alloy high-strength steel, said to be widely used in the transportation industry. Illustrations of fabricating operations and technical data are presented.

The versatile single spindle chucking automatic

Here is the machine tool that combines the flexibility of the turret lathe *and* the economy of the automatic. Camless operation eliminates expense and time lost in making, storing, finding and changing cams.

The Warner & Swasey 1-AC Single Spindle Chucking Automatic has been accepted enthusiastically by industrial concerns. How profitably it is working out for them in increasing production while cutting costs on short and long runs is proven by numerous field reports such as these:

"This one 1-AC will reduce labor costs alone by $8,000 per year on a one-shift basis. Production up 118%."

"Production increase of 260% over old method of manufacture."

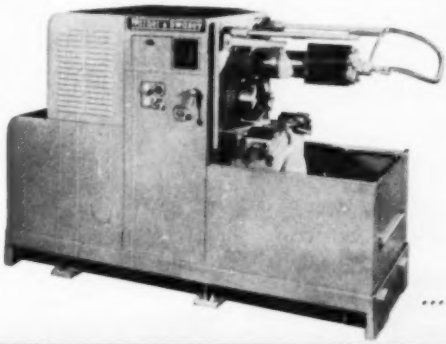
"On one job production went from 17 per hour to 60 per hour, and operator could easily run 3 machines."

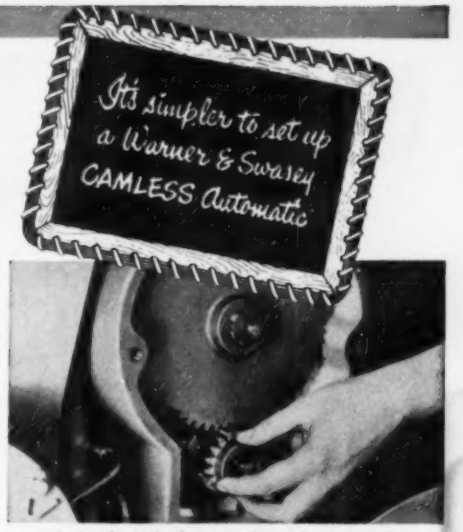
"The 1-AC produces this part 30% faster . . ."

"We now make in one hour what it took a very old single spindle automatic 6 hours to produce."

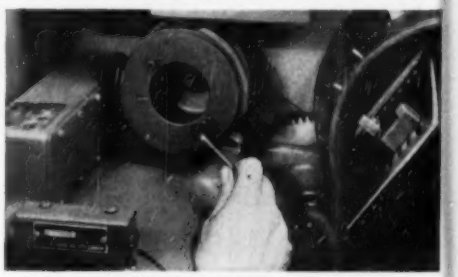
"Average cutter life of 16 hours in SAE 4140 forgings on a job with a light, interrupted cut."

Find out what it can do for you. Call your nearest Warner & Swasey Field Representative or write Warner & Swasey, Cleveland 3, Ohio.





A simple pick-off gear selects the automatic speed range you desire.



Late cross slide operation and dwell is set for each slide on this rotary trip drum.

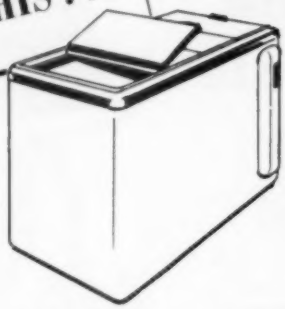
Easily adjusted "Quick-Set" mechanism controls automatic feed and speed changes and skip indexing.

Warner & Swasey sells one thing ... increased production

WARNER & SWASEY Machine Tools *Cleveland*

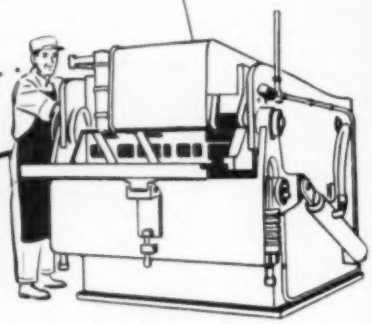
TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

For Tangent Bends
LIKE THIS . . .



with labor savings up to 75%

You need . . .



STRUTHERS WELLS

TANGENT BENDERS

in the Production Line

Every plant executive responsible for product design and development—or economies of production, should have the complete technical and illustrative data on Struthers Wells Tangent Benders. May we send you a copy, or would you rather discuss applications with our engineers?

STRUTHERS WELLS
Corporation
TANGENT BENDER DIVISION
TITUSVILLE, PENNA.

Struthers Wells

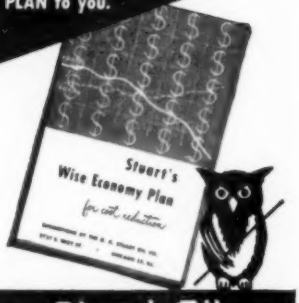
REDUCED MACHINING COSTS RESULT FROM WISE SELECTION OF CUTTING FLUIDS

•

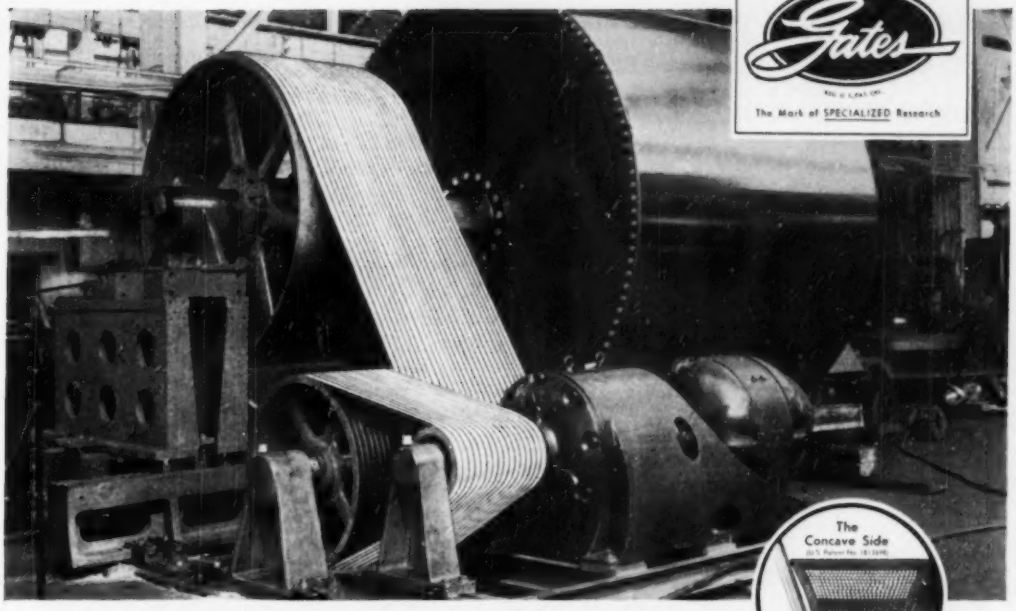
STUART'S WISE ECONOMY PLAN provides the method

Not just another spot check "oil survey," the Stuart plan is a scientific appraisal of a plant's over-all needs coupled with *practical* suggestions and followed through with a continuing technical service.

Ask to have a Stuart Representative explain the WISE ECONOMY PLAN to you.



D. A. Stuart Oil Co.
2729 S. Troy St., Chicago 23, Ill.



This Gates Vulco Rope Drive has an unusual task. It revolves a 12-foot, 55-ton Drying Roll in a Roll Grinder at about one R.P.M. The double-reduction V-Belt Drive replaced gears because even at this slow speed the backlash of the gears resulted in chatter marks on the surface of the roll. The resilience of the Gates Vulco Ropes results in a smooth, mirror-like surface on the rolls.

Two Distinct *Savings* in *V-Belt Costs* Are *Yours* with Gates Vulco Ropes

A simple test that takes less than two minutes will save you many dollars in V-Belt costs. Here it is—

Have someone bend a V-Belt exactly as it bends in going around its pulley. As it bends, grip its sides with your fingers. You will *feel* those sides *change shape*. In a straight-sided V-Belt, the sides become *convex* as the belt bends. And note how the sides *bulge out*. (Figures 1 and 1A)

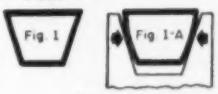
Now try the same test with a V-Belt that is built with the concave side. You will feel a change in shape—but a *different result!* The sides do not become *convex*. Instead, they become perfectly straight. *The bent belt now has a shape that exactly fits its sheave groove*—as shown in Figures 2 and 2A.

Two distinct savings result. *First*—There is no side-bulge to cause uneven wear. The sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in *longer life!* Second—The *full width* of the sidewall grips the pulley—thus carrying heavier loads without slippage—and this *saves belts* and also saves *power!*

When you buy V-Belts, be sure you get the V-Belt with the Concave Sides... the Gates Vulco Rope!

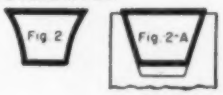
What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove.

Gates Vulco Rope with Concave Side.



No Side Bulge. Precise Fit in Sheave Groove.

C. S. 501

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

DRY SMALL PARTS QUICKLY and ECONOMICALLY with BARRETT CYCLONE CENTRIFUGAL DRYERS

The Barrett Centrifugal Dryer — efficient, self-contained, and compact is built in several sizes.

● The Barrett Parts Drying Process centers around a method of creating a guarded cyclone.

In operation, parts to be dried are placed in a well ventilated motor driven rotating basket. Free liquid is immediately thrown off by centrifugal force and any moisture remaining on parts is absorbed in the shortest possible time by the large volume of expanded air continually forced over and through the contents. Provision is made for heating and expanding, also boosting the flow of incoming air to assure faster absorption of moisture. With the large exhauster provided, heated air is not always required.

Direction of basket rotation can be quickly reversed which will change position of the load and accelerate drying. Baskets are available in shapes which experience has shown to be most effective for handling various classes of work.

It will pay to investigate the advantages offered by Barrett Centrifugal Dryers on your work.

Full Details of the Barrett Cyclone Dryer Sent Promptly on Request.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

"Oakite's new formula for cleaning brass and copper before nickel and chrome plating is tops!"

From Connecticut to California, electroplaters are enthusiastic about the NEW Oakite brass-cleaning method that gives good protection against tarnish along with effective removal of oils and buffing compounds. Here are a few comments:

Wonderful cleaner for brass . . . Results have been excellent . . . Not a single reject on brass and copper work in two months . . . Good cleaning combination . . . All parts plate perfectly . . . Worth its weight in gold . . . No discernible tarnish during anodic cleaning . . . Rejects at lowest point ever . . . Nickel plate extremely adherent, very bright and lustrous . . . Getting excellent results in automatic plating machine . . . 15 to 20 seconds reverse did perfect job . . . Much brighter plating, much better adhesion . . . Could not detect any tarnish . . .

FREE Write today to Oakite Products, Inc., 24 Thames St., New York 6, N. Y., for full information.

SPECIALIZED INDUSTRIAL CLEANING

OAKITE

MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. & Canada

A press brake equipped with Wittek No. 6-L Automatic Roll Feed

You Can't Beat WITTEK

Wittek Roll Feeds are made in standard models to meet every requirement in the automatic feeding of strip stock to punch presses or press brakes. The distinguishing feature is their simple and economical method of operation which does away with complicated parts thereby assuring *speed* and *accuracy* in the feeding of various kinds and thicknesses of material.

Wittek Adjustable Reel Stands are designed as companion units to Wittek Automatic Roll Feeds and are available in seven different models to handle *ALL* types of coiled strip stock and wire being fed to punch presses or similar production machinery.

Write for complete descriptive literature.

WITTEK Manufacturing Co.
4320 West 24th Place
Chicago 23, Ill.

Automatic ROLL FEEDS AND REEL STANDS

HERE'S HOW TO REDUCE YOUR TOP-HEAVY V-BELT INVENTORY

..and keep your machines producing

WE'RE not the people to solve *all* your stockroom inventory problems—but, when it comes to stocks of v-belts, we can help.

There's no need to tie-up money and valuable stockroom space with hundreds of sizes of endless v-belts. Four reels of Veelos, the adjustable v-belt, can *replace* up to 316 sizes of endless v-belts—in the O, A, B and C widths. You may not use all these widths. If not, one or two reels of Veelos may be enough.

Veelos is easy to install without dismantling outboard bearings. Veelos runs true—delivers steady, full, vibrationless power. Veelos cuts down on machine maintenance because uniform tension can be maintained on all belts—relieving strain on bearings.

You *save* when you shift to Veelos.

WRITE FOR YOUR COPY

of the Veelos Data Book. It gives complete engineering, measuring and installation information on Veelos v-belts.

MANHEIM MANUFACTURING & BELTING COMPANY • MANHEIM, PA.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard widths, fits all standard grooves. Three types: regular, oil-proof, static conducting. Double V in A and B widths. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. Veelos is known as VEELINK outside the United States.

VEELOS
THE LINK
V-BELT

The

GOSS & De LEEUW

ONE TWO THREE

7 spindle tool rotating automatic chucking machine

Four Machine Spindles **for boring, turning, facing and reaming operations on one to three ends provide** greater and quicker production than any other "chucker" in the machine tool industry.

Three Threading Spindles perform from one to three right or left hand single or double threading operations, on one, two or three ends simultaneously, in perfect alignment, at productions from 100 to 500 pieces per hour.

Write for further interesting details.

Goss & DeLeeuw
MACHINE COMPANY
KENSINGTON, CONNECTICUT, U.S.A.

FOR SHARPENING . . .

- Milling cutters
- Gear cutters and reamers

GRAND RAPIDS No. 60
Universal cutter and tool grinder

Features:

- Anti-Friction Bearing Table
- Four Spindle Speeds
- Two Work-Head Speeds
- Greased-for-Life Spindle
- Bijur, one-shot lubrication system

Your letter will bring you complete information and specifications.

GALLMEYER & LIVINGSTON COMPANY

GRAND RAPIDS GRINDERS

330 Straight Ave., S.W., Grand Rapids 4, Michigan

● Immediately a "ROCKWELL" or "TUKON" Hardness Tester is put into use, its purchase price becomes its least important feature. From then on the only measure of value is the accuracy of every test made.

The dependable, enduring accuracy of all Wilson hardness testing equipment is assured by Wilson's long experience, the Wilson Standardizing Laboratory and Wilson Field Service Engineers. In terms of hardness testing service, Wilson offers you most for every dollar you invest.

WILSON
MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

ACCO

230-B PARK AVENUE, NEW YORK 17, N.Y.

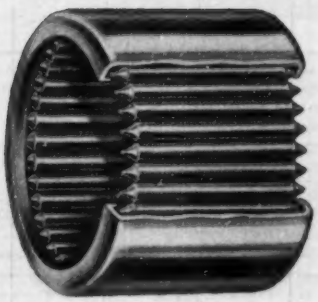
TORRINGTON NEEDLE BEARINGS

give maximum load distribution

Torrington Needle Bearings distribute radial loads over a greater bearing area than any other type of anti-friction bearing of comparable size.

This unique engineering feature of Torrington Needle Bearings assures maximum load capacity for any given housing or shaft size.

Where you encounter high load conditions with fixed or rigid space limitations, you will find the Torrington Needle Bearing specially engineered to give you this and other important advantages. Why not discuss your problem with our engineers? They'll be glad to help you.



THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

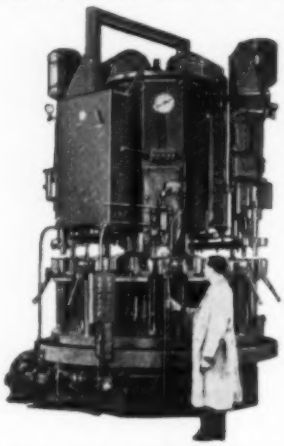
TORRINGTON *NEEDLE* BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • BALL • NEEDLE ROLLERS

How to Combine Machining Operations in Less Floor Space

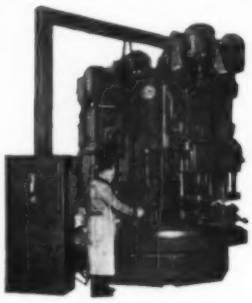
Here are two interesting examples of high production machining in relatively small floor space. Rather than string each operation out in a long line with conveyors, the operations are performed in fixtures held on a rotary indexing table.

5 OPERATIONS ON 240 PARTS PER HOUR IN 79 SQ. FEET . . .



This type VSI vertical indexing drilling machine is designed for drilling, reaming and chamfering five bolt holes and drilling and chamfering one 18" hole in automotive rear axle.

4 OPERATIONS ON 130 PARTS PER HOUR IN 84 SQ. FEET



This type VSI special vertical automatic indexing machine is provided with eight two station fixtures for holding one each right and left hand spindle assembly supports. Operations include drilling, reaming, chamfering and sawing. While each head is hydraulically actuated, on the machine illustrated, electrical mechanical heads are also available.

Write for free additional information today.
Ask for bulletin 160.

DAVIS and THOMPSON CO.
MANUFACTURERS OF *Machine Tools*
MILWAUKEE 14, WISCONSIN

RUTHMAN
THE NUMBER

More and more of the leading manufacturers of metal cutting machinery are installing Ruthman Gusher Coolant Pumps as standard equipment on their machines. They find through experience that Ruthman Precision Built Gusher Coolant Pumps give better Production and longer pump life on metal working equipment.

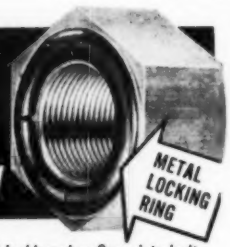
Join these leaders in the machine tool industry. Specify Ruthman Gusher Coolant Pumps on all your machinery. Write for our catalogue now.

COOLANT PUMP

THE RUTHMAN MACHINERY COMPANY

1818 Reading Road, Cincinnati, Ohio

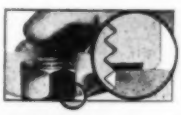
An-cor-lox gives *FULL* locking security



1. When nut is pulled up, metal locking ring flows into bolt threads, wedging the lock nut threads into a positive lock.
2. Once flattened by use, the non-springing locking ring stays deformed, even after backing off. Grip is increased by re-use.
3. Vibration and shock will not walk bolt off—they serve only to force the locking ring farther into the threads.
4. Bolt stretch, wear and moisture do not affect the lock.
5. Up to softening point of the metal, high temperatures do not lessen gripping power.
6. Crushed locking ring prevents passage of gas or liquids.

Available in high, thin, cap or spanner designs

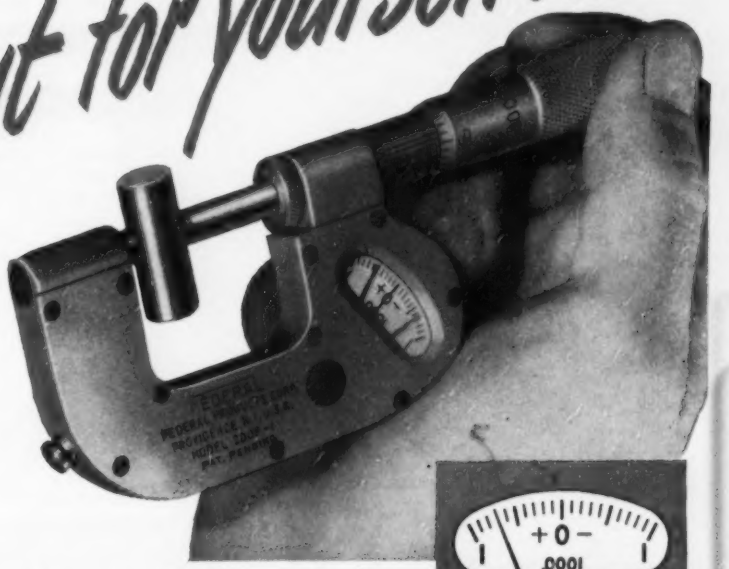
Note wedging action of flattened metal ring



Send for test samples and catalog

An-cor-lox *Lock Nuts*
TRADE MARK REGISTERED
LAMINATED SHIM CO., Inc., *An-cor-lox Division*, 3182 Union St., Glenbrook, Conn.
AN-COR-LOX NUTS • SHIMS • SHIM STOCK • STAMPINGS

Find out for yourself....



why people who try it buy it!

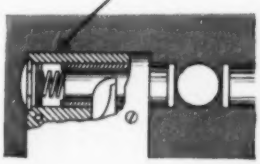
You've used regular "mikes" for such a long time you'll be amazed at the downright accuracy and plain honest-to-goodness convenience you can get with this CONSTANT PRESSURE, INDICATING MICROMETER. Just try it and you'll know why so many are buying it!

You'll discover the Federal MIKEMASTER has more worthwhile advantages than any other micrometer. It's the first really new micrometer made in this country in years. Once you've used it you'll recognize its superior accuracy — and you'll appreciate the convenience of reading an indicator instead of barrel graduations. You'll see how easy it is to check out-of-round and taper, too. You'll find its "repeat" accuracy matches some of your laboratory gages even though it sells for so much less money.

You'll also be pleased with the usefulness of the pushbutton Retracting Anvil and the Tolerance Hands when measuring duplicate parts. You'll find extra value in the *lapped*, Tungsten Carbide Anvils — and you'll just naturally like its nice balance and its *rust-proof*, dull chrome finish.

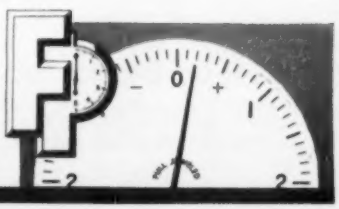
You don't have to take our word for it. Find out for yourself. Ask to see the Federal MIKEMASTER . . . and to try it on your work. Write to Federal Products Corporation, 1122 Eddy Street, Providence 1, R. I.

You'll appreciate the convenience of reading the Indicator instead of barrel graduations. The *constant pressure* of the anvil means constant measuring pressure every time.

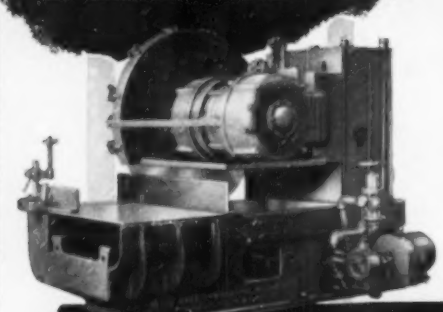


FEDERAL

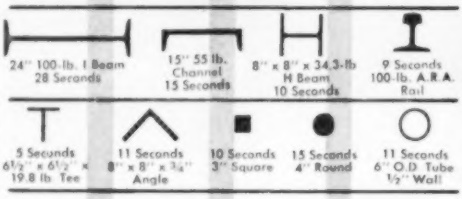
Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES



Modern Sawing



with **KLING** HIGH SPEED FRICTION SAWS



Friction sawing is one of few mechanical processes which employ the heat of friction in a useful manner. It concentrates heat on the material to be severed at a rate which is faster than it can absorb heat. The immediate temperature rise of the contact surface is so great that its strength is reduced considerably lower than that of the colder blade rim. This heated surface is readily removed by the blade and permits complete severing of the material rapidly with no loss of metal from the blade.

Because of its versatile ability to cut many varied structural shapes, as well as solid or hollow bars in any sequence, without change of blade or set-up, one machine can handle a volume of cutting that would otherwise require several separate shears or slow speed saws.

Consult Kling engineers regarding your metal cutting problems. State size of material to be cut. Bulletin No. 9200 giving full particulars and suggestions as to the type and size of saw will be mailed promptly. No obligation.

KLING BROS. *Engineering Works*

Punches; Bar, Angle and Rotary Shears; Combination Shear, Punch and Copers; Plate and Angle Bending Rolls; Heavy Duty Grinders

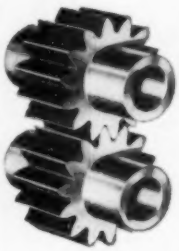
1328 AM N. KOSTNER AVENUE, CHICAGO 51, ILLINOIS, U.S.A.

when

PERFORMANCE IS IMPORTANT TRY *Cincinnati*

Gears, Good Gears Only . . .

The traditional dependability of Cincinnati Gears, Good Gears Only, under the toughest of operating conditions is being emphasized as never before.



Bettered by every advantage that modern science and accepted and proved techniques can give, they are representative of that standard which for more than 40 years has made "Gears, Good Gears Only", the first choice of industry.

SPUR • BEVEL • HELICAL • SPLINE
WORM • SPROCKET • SPIRAL BEVEL
INTERNAL • *CONIFLEX • *ZEROL

*Reg. U. S. Pat. Off.

THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

ONLY $215* FOR
THE GREEN ENGRAVER
. . . yet it's fast, versatile and rugged enough for die steel

The Green Engraver offers great speed and convenience. Quickly cuts up to four lines of letters from 3/64" to 1" on curved or flat surfaces whether made of metal, plastics or wood . . . operates by merely tracing master copy — *anyone* can do an expert job. Special attachments and engineering service available for production work. Just the thing for radio, electronic apparatus and instrument manufacturers. Write today.

For *quality* engraving on

• Panels • Molds • Lenses • Scales
• Dials • Name Plates • Instruments

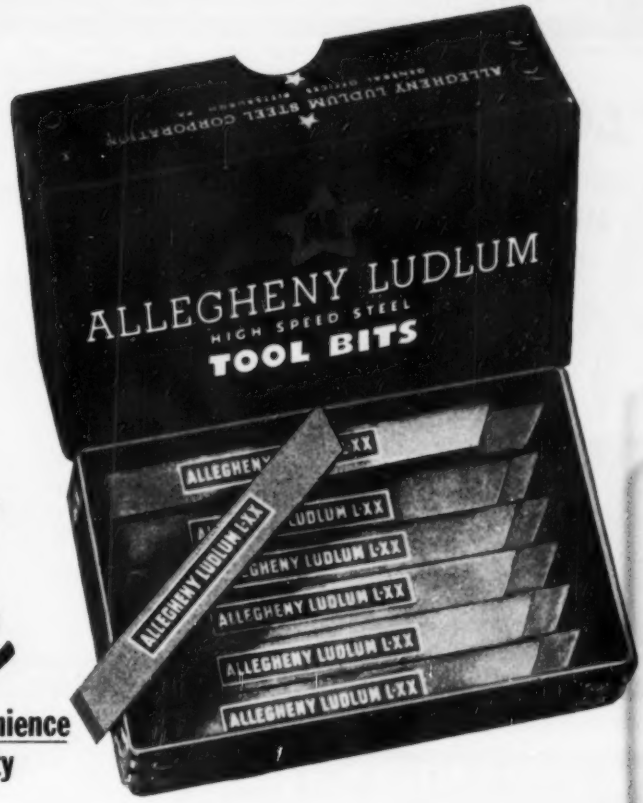
. . . also does routing, profiling and three dimensional modeling.

**Price does not include master type and special work holding fixtures.*

GREEN INSTRUMENT CO.
371 Putnam Ave., Cambridge, Mass.

Ready Made

—these bits give you convenience economy, dependability



• SUPER PANTHER • PANTHER SPECIAL • ML • LXX • • • • • SUPER DBL • • • • • DBL-2

Pocket Price List NOW READY!

Just send a postal-card request—giving name, position, company, and address. Ask for "A-L Tool Bit Price List," pocket edition. While you're writing, also include the illustrated four-page folder, "A-L Mill Treated High Speed Steel Tool Holder Bits." Yours for the asking.

Write Today

ADDRESS DEPT. AM-2

These better tool bits, packed in the famous blue-and-gold boxes, are immediately available in standard sizes from stocks located at 28 convenient points throughout the country.

Ready Made—this means that bits are: (1) already cut to correct lengths, with clearance bevel at both ends; (2) already heat treated uniformly by mill experts; (3) furnished with either regular finish or ground finish; (4) inspected individually for hardness, size, and surface. "Finish-ground" bits are extremely accurate in dimension, entirely free from decarburization and scale, and ready for instant use upon grinding the cutting point to desired shape.

With six popular grades to choose from, you can cover a wide range of cutting needs by specifying these tool bits. Our informational service will be useful to you in selecting grades. Call A-L, or an A-L distributor.

ALLEGHENY LUDLUM STEEL CORPORATION
Pittsburgh, Pa.

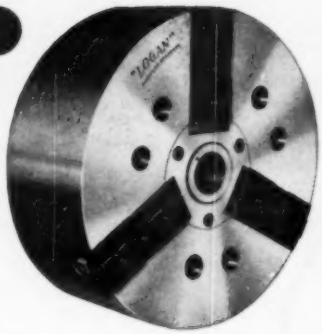
TOOL STEEL DIVISION: DUNKIRK, N. Y.

Fine Tool Steels Since 1854

* Fluid Power Improves Production

"LOGAN"

AIR AND HYDRAULIC POWER-OPERATED CHUCKS



...WITH OPEN OR CLOSED CENTER

*FREE ENGINEERING SERVICE

Our engineers will solve your chucking problems with Logan special chucks, mandrels and collet chucks. No obligation.

• 32 years' engineering know-how • Completely equipped plant • Satisfaction assured • Complete range of standard types • Extra factors of strength and durability • Accurate, dependable service.

For your complete air and hydraulic chucking systems, Logan offers an extensive line of rotating cylinders, control valves, accessories, hydraulic power units and Collet Grip tube fittings.

Logan SAVES • TIME • EFFORT • MOTION

Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC. 818 Center Ave Logansport, Indiana

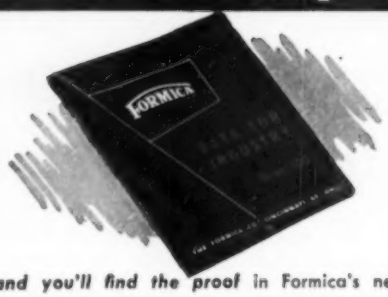
FREE CATALOGS

Write for catalog No. 70, Section 1, on Logan air and hydraulic-operated chucks; catalogs Nos. 90 and 91 on air valves and cylinders.

CHUCKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

FLUID POWER SPECIALISTS SINCE 1916

YOU CAN DO IT BETTER WITH FORMICA

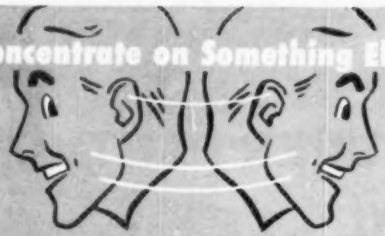


and you'll find the proof in Formica's new "DATA FOR INDUSTRY" . . . the most comprehensive technical handbook on laminated plastics ever produced. Properties and performance characteristics for every grade are at your fingertips in this 96-page, durably bound reference volume. Send $1.00 today for your own personal, numbered copy. Learn how Formica can serve you, whatever your requirements.

FORMICA
4694 SPRING GROVE AVE.,
CINCINNATI 32, OHIO

Productive FORMICA at Work in Industry

Concentrate on Something Else

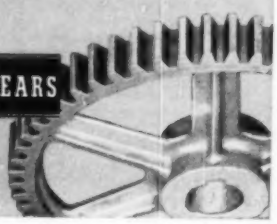


One reason why we're still doing business successfully after forty-five years of manufacturing gears of all types for a variety of industries is because we have continuously maintained the policy of making sure that each customer gets exactly the right gear for the job. Since we expect to continue in business for a great many years, it stands to reason that this policy will never be compromised. Therefore, you can turn your gear problems over to us—while you concentrate on something else.

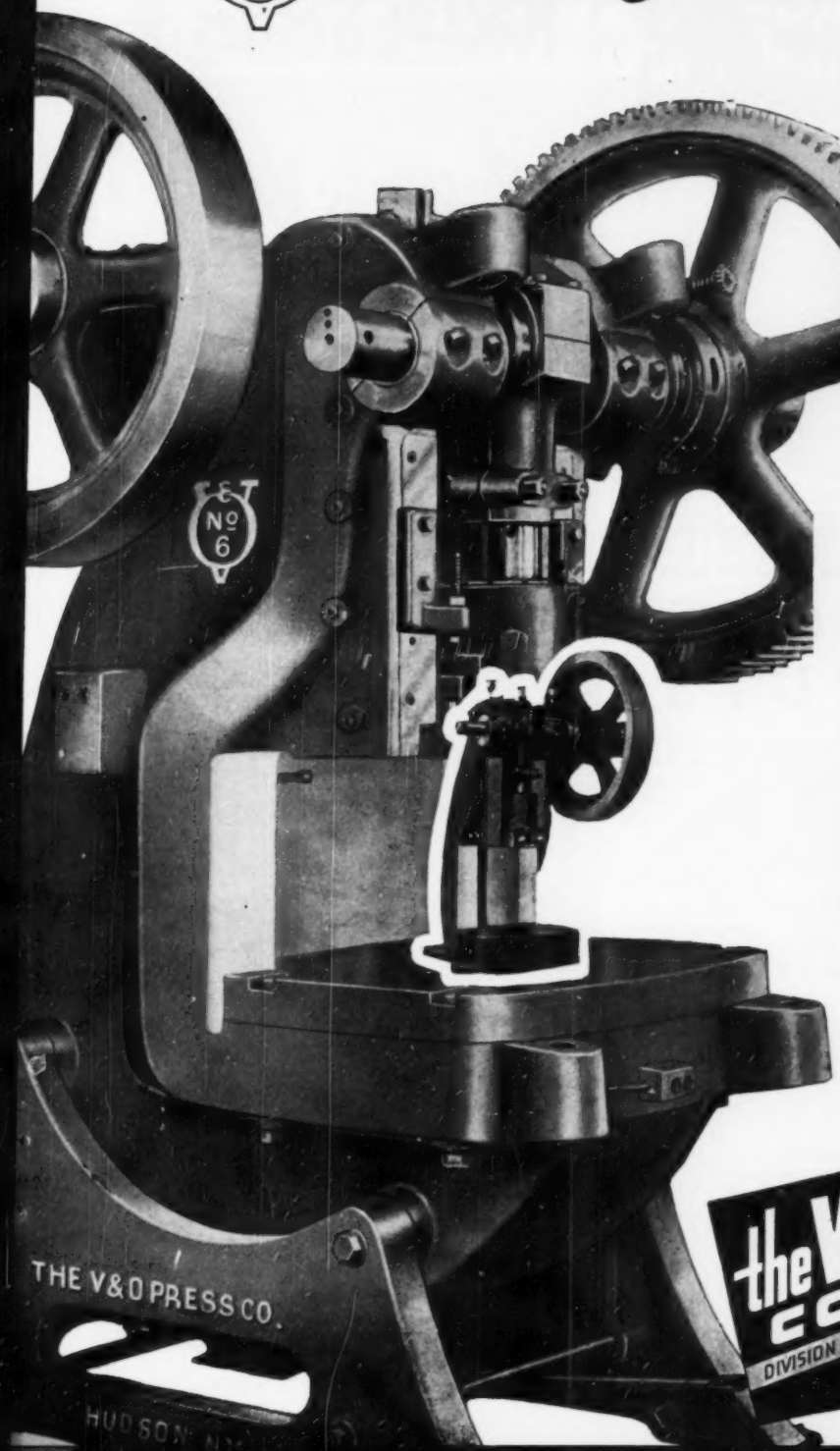
THE EARLE GEAR & MACHINE CO., 4707 Stenton Ave., Philadelphia 44, Pa. Sales Offices: New York City; Youngstown, Ohio.

EARLE GEARS

It's good business to do business with EARLE.



V ..to fit your needs..



Wise executives have found out that V&O's precision built POWER PRESSES, ranging from the three-ton minimum to 105-ton maximum with twenty other graduated sizes in between are the answer to profitable, highspeed production. Each and every V&O POWER PRESS, be it one of the STANDARD or T LINE INCLINABLE types, DOUBLE ACTION, STOCKMASTER OR BENCH PRESSES, is a true representative of sound engineering and construction features developed during 60 years of designing and manufacturing POWER PRESSES for a complete cross-section of mass-production industries. Careful workmanship, close inspection and proper selection of materials are combined in the V&O POWER PRESS THAT IS FIT FOR YOUR PRESENT NEEDS.

• • •

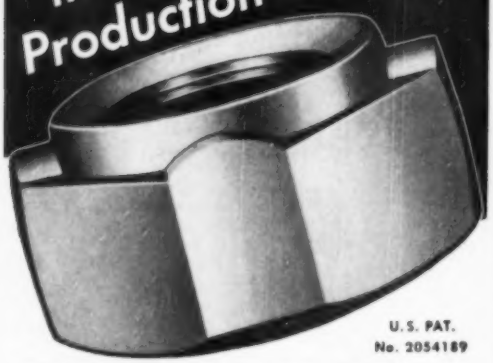
Ask about the V & O Feed-O-Matic Safety Punch Press Feeder.

the V&O PRESS COMPANY

DIVISION OF ROCKWELL MANUFACTURING CO.

HUDSON, N.Y.

They LOOM LARGE in an Efficient Production Schedule



U. S. PAT. No. 2054189

MIDLAND WELDING NUTS

5/8" F-2016-A

1/2" F-2012

3/8" F-2008

5/16" F-2006

1/4" F-2004

- Self locating, assuring accuracy and rapid assembly without locating pins or fixtures.

Reduce inventory. Midland Welding Nuts can be used on a wide variety of metal thicknesses, eliminating different heights of collars.

Offer many other advantages. Write, wire or phone for complete information.

The MIDLAND STEEL PRODUCTS CO.

6662 Mt. Elliott Avenue • • Detroit 11, Michigan

WORLD'S LARGEST MANUFACTURERS OF AUTOMOBILE FRAMES—

Kester Solder

Kester engineers, with over 100,000 different types and sizes of solder available, will specify the right flux-core solder for the job.

Easier to Use

Using the most suitable solder for each operation will enable solderers to work at top speed without sacrificing quality. No rejects.

Top Quality

Only newly mined grade A tin and virgin lead used. Fluxes—chemically correct.

KESTER SOLDER COMPANY
4201 Wrightwood Ave., Chicago 39
Newark, N. J. • Brantford, Canada

KESTER SOLDER

SEND FOR FREE MANUAL, "SOLDER and Soldering Technique"

TRADE TUMICO MARK

TUBULAR MICROMETER CO.
ST. JAMES, MINNESOTA, U.S.A.

43 GEARMOTORS drive series of 3 Conveyors..

...at Benwood Works of Wheeling Steel Corp.

This interesting installation is typical of the versatility and efficiency of Philadelphia GearMotoR applications . . . It consists of 43 2 h.p. units operating from "Reliance" 30 V*S Drives to provide speeds that vary from 50 to 500 r.p.m. The Philadelphia GearMotoR is used by hundreds of companies throughout industry because: It is a self-contained, extremely compact unit that conforms to recommended standards of A.G.M.A. and N.E.M.A.; it is available in single, double and triple reductions (range of speeds run from 780 through 7.5 r.p.m.:) motor rating from 1 h.p. through 60 h.p. . . . A-c or D-c Motors are precision-built and fit perfectly with gear unit. Gears are helical type, (long-lived and quiet) and made of quality alloy steel, precision machined (teeth shaved) and induction-hardened. Assembly is very simple: Motor and gear units are each self-contained, yet readily separated; gears in multi-reduction units may be inspected without uncoupling from driven machine. Lubrication is of positive "splash type," with large reservoir. Gear housing is leak-proof, and motor (which is greased independently) has double-shielded ball bearing design.

Send for 42-page illustrated catalog, and please use your Business Letterhead when requesting it.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

SETS THE STANDARD FOR INDUSTRIAL JOINTS IN ALL TYPES OF INDUSTRY...

Look for this Trade-mark Ⓒ on every Joint.

7 outstanding features that have resulted from over 20 years' experience in making industrial joints, to meet specific demands in hundreds of applications, for widely diversified industries.

No. 1 & No. 2 — FORKS — alloy steel, heat treated for maximum strength and wear — inside surfaces accurately ground for smooth operation — pin holes broached and honed for perfect alignment — O.D. cylindrically ground for concentricity.

No. 3 — CENTERBLOCK — holes intersect accurately in center with faces parallel. Hardened and precision ground for long life, with recess for Telltale Lock Ring. Lo-Friction block furnished in sizes 1¼" up.

No. 4 & No. 5 — PINS — being hardened and centerless ground to close tolerances reduce radial play.

No. 6 — OILER — originally patented by Curtis — plus oil holes and lubrication passages, insures that your oil reaches all bearing areas.

No. 7 — "TELLTALE LOCK RING" — a Curtis patent — snaps into a groove in small pin and fits into protective recess in centerblock, firmly locking entire assembly. End of "Telltale" shows ring in locking position. Makes disassembly and reassembly quick and easy. No nuts or set screws to work loose.

Send your control or power transmission problems DIRECT TO US — there is a Curtis Engineer ready to work with you — to recommend and furnish you with the right universal joint for your application.

Here, at the Curtis plant, we stock 14 standard sizes, solid or bored, ranging from 3/8" diameter to 4" O.D.

Orders are shipped the same day as received.

Send your orders to CURTIS!!!!

CURTIS UNIVERSAL JOINT CO. INC.

You should know MORE about

FULMER HONING MACHINES

Fulmer Model 412
½"-4" honing capacity

...to get high speed accuracy on finishing all types of cylindrical bores from ½" to 30" diam. Fulmer Honing Machines remove stock **faster,** more **economically,** with **greater** accuracy, than **any other method.** Rugged in construction, simple to operate, Fulmer Honing Machines give maximum production with minimum investment.

★ **WRITE FOR NEW HONING BULLETIN, fully illustrated.** Gives valuable information on honing applications, **Alexander Ball** tools, and specification details on all models of Fulmer Honing Machines.

HONING TOOLS NOW AVAILABLE!

The **Alexander Ball** line of honing tools is now distributed exclusively in the United States by C. Allen Fulmer Co. Available in sizes from ½" to 50" diam. In many sizes of these tools, removable flanges are available in 1" or 3" increments of diameter. The same stone holders and basic tool are used. With **Alexander Ball** Tools the investment is very low where a wide range of diameters are honed. Write for complete details and prices.

C. ALLEN FULMER CO. 1234 First National Bank Bldg. CINCINNATI 2, OHIO

STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

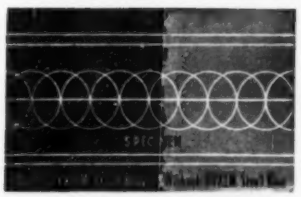
Full details on request.

Straight Side Press

ZEH & HAHNEMANN CO.
NEWARK N. J.
180 Vanderpool Street

DYKEM STEEL BLUE

STOPS LOSSES
making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301 B North 11 St., St. Louis, Mo.
In Canada: 2400 Dundas St. West, Toronto, Ont.

This tubular fireman always rings the bell!

courtesy

Beacon Devices, Inc.

Here's a fire warning that never fails—a bottle of compressed CO_2 that keeps watch while you're asleep. The moment temperature reaches 130° F, gas is automatically released into the whistle stem . . . result, a warning blast audible for a quarter mile.

Both cylinder and whistle for this self-contained signal are fabricated from seamless mechanical tube—right out of Frasse warehouse stocks. The manufacturer makes it a policy to rely on Frasse tubing for his fire warning and fire fighting devices. For, along with 24 hour delivery convenience, he has found dependability . . . every cylinder withstands a pressure test of 3,000 psi—in 8 years *he has never had a failure.*

Whatever your quality tubing requirements, make it a point to check the wide variety of specifications and sizes available immediately from Frasse warehouses. You'll find mechanical tubing, stainless tubing, aircraft tubes, and condenser, hydraulic and pressure tubes in unusually complete selections. And Frasse engineering facilities ready to help you choose for most economical advantage. *Call Peter A. Frasse and Co., Inc., 17 Grand Street, New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Ave., Philadelphia 29, Pa. (Baldwin 9,9900) • 50 Exchange Street, Buffalo 3, N. Y. (Washington 2000) • Jersey City • Syracuse • Hartford • Rochester Baltimore*

FRASSE for Steel Tubing

Seamless and Welded Mechanical Tubing • Aircraft Tubing • Condenser, Hydraulic and Pressure Tubes • Stainless Tubing—Seamless and Welded • Stainless Pipe, Valves and Fittings

Yours Now

New Facts and Tips on Machining Mechanical Tubing

Your copy of this new 12-page booklet is fact-packed with data on machinability of seamless mechanical tubing. Includes valuable information and practical recommendations for tool design. A guide you'll refer to profitably, whether you use automatic screw machines or other types of machining. Write now—send the coupon for your free copy.

Peter A. Frasse & Co., Inc. 60-0
17 Grand Street
New York 13, N. Y.

Please send me your new, free booklet on machinability of seamless tubing.

NAME _____ TITLE _____

FIRM _____

ADDRESS _____

CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at all Speeds. 4. Concentrated and Convenient Push-Button Controls. 5. Constructed on Unit Principle.

THE CARLTON MACHINE TOOL COMPANY

CINCINNATI 25, OHIO, U. S. A.

HERE'S A WAY TO CUT COST CORNERS

Designed for high production, smooth performance, Linley Riveting Machines are the answer to economical assembly problems. Spinning principle shapes heads silently . . . with controlled pressure and adjustable spindle stroke. Capacities to ⅜" diameter. Thrust bearing supports spindle, assures long life. Eight models.

The ingenuity and "know-how" that goes into these machines can be put to work on your riveting problems. Call, write . . . or come in any time.

LINLEY BROTHERS CO.

674 STATE ST., EXTENSION
BRIDGEPORT 1, CONNECTICUT

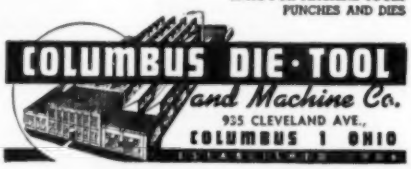
SEND SAMPLES
We will gladly rivet sample parts and return them for your inspection.

8 LN 49

ACCURACY
Efficiency
Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. Do not hesitate to consult us, our experience in this field is most comprehensive.

JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



Arch Sub-Press

WALTHAM SUB-PRESSES...

. . . for precision work

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.

Overhang Sub-Press

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE

FORTIFIED 4 WAYS

. . . to give you better hydraulic performance

1. OXIDATION STABILITY	Increasing service life of oil by fortifying it to withstand high pressures, heat, moisture and agitation.
2. GUM SOLVENCY	Ability to hold gums and sludges in suspension, assuring longer service life and smoother hydraulic operation.
3. CORROSION RESISTANCE	Additive treatment to protect against formation of rust in system.
4. FILM STRENGTH	Reducing wear on working surfaces, which means reduced maintenance and higher pump efficiency.

Longer oil life means longer machine life at lower maintenance cost. That's why HYDRO-DRIVE excels. For technical bulletin write

E. F. HOUGHTON & CO.

303 W. Lehigh Ave., Phila. 33, Pa.

HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE
HOUGHTON'S HYDRO-DRIVE • HOUGHTON'S HYDRO-DRIVE

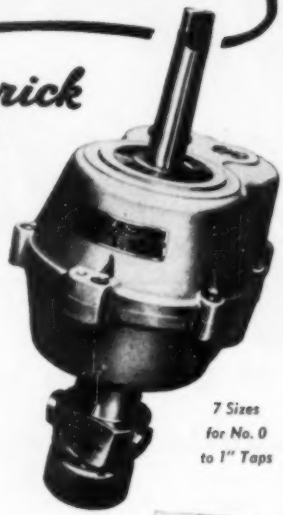
HERE'S HOW TO DO FAST ACCURATE TAPPING RIGHT ON YOUR DRILL PRESSES

Ettco-Emrick

TAPPING ATTACHMENTS

For regular production tapping or extra tapping capacity, just mount one of these inexpensive tapping attachments on your drill press. They'll fit *any make or model* and are designed to turn out clean, accurate threads. It's the combination of hair-trigger sensitive friction clutch and automatic reverse that assures top tapping speed as well as full tap protection.

Be sure of getting the genuine. Ask for Ettco-Emrick Tapping Attachments by name. They're sold at leading Mill Supply Houses throughout the country. For details write for Bulletin No. 22.



7 Sizes for No. 0 to 1" Taps

FREE BULLETIN No. 22

Ettco-Emrick

TAPPING ATTACHMENTS
DRILL AND TAP CHUCKS
FIXED AND ADJUSTABLE MULTIPLE SPINDLE HEADS
FOOT OPERATED AND ELECTRIC AIR TAPPING MACHINES
INDEXING FIXTURES
SPECIAL MACHINES

ETTCO TOOL CO., 590 JOHNSON AVE., BROOKLYN 6, N.Y.
Please send Bulletin No. 22 describing Ettco-Emrick Tapping Attachments.

Name _____

Company _____ Position _____

Address _____

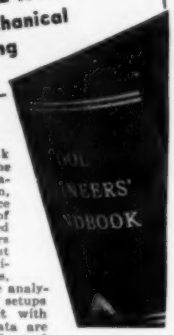
MP QUALITY GEARS CUT TO ORDER MP

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

MP MEISEL PRESS MFG. CO. MP
946 Dorchester Avenue Boston, Mass.

JUST PUBLISHED

An outstanding reference on PLANNING, CONTROL DESIGN, TOOLING and OPERATIONS in the mechanical manufacturing industries



THIS handbook brings you the most modern, authoritative data on the design, fabrication, maintenance and economical use of tools and machinery used in industry. It covers product design and cost estimating, the economical selection of machines, processes, and tools, the analysis and improvement of setups and operations. Use it with complete confidence. Data are based wherever possible and practicable, on standards established by the government, professional associations and leading industrial companies.

TOOL ENGINEERS HANDBOOK

American Society of Tool Engineers
Frank W. Wilson, Editor-in-Chief

Written by 144 authorities in the field, this massive reference, consisting of 115 big sections covering tool engineering from A to Z, has been checked and double checked from cover to cover to insure accuracy. Here are the complete, authoritative answers to your problems, brought to you in compact, easy-to-find form.

More than 2000 pages! Over 1500 illustrations! Hundreds of tables, charts, keyed diagrams, symbols, definitions, equations, etc.

A small selection of highlights selected at random to illustrate the scope of this Handbook:

- Describes types of machines, cutting tools, tool holders, fixtures and operations in precision production boring.
- Includes all new techniques and processes of recognized acceptance including Powder Metallurgy, Investment Casting, Plastic Joining of Materials, etc.
- Conventional tables of feeds, speeds and cuts modernized to bring them into line with latest cutting-tool materials and cutting practices.
- Treats, process-wise, such topics as Plaster Mold Casting, Superfinishing, Rotary Swaging, Sheet and strip cold roll forming, Die Hobbing, etc.
- Covers every phase of metal cutting and machinability.
- Discusses welding, gluing and mechanical joining of materials.

SEE IT 10 DAYS FREE

McGRAW-HILL BOOK CO.,
330 W. 42nd St., N.Y.C. 18, N.Y.

Send me the A. S. T. E.'s TOOL ENGINEERS HANDBOOK for 10 days' examination on approval. If the book proves satisfactory, I will remit $3.00 in 10 days, and $3.00 monthly until $15.00 is paid. Otherwise I will return the book postpaid after 10 days. (We pay for delivery if you remit first payment with this coupon; same return privilege.)

Name _____

Address _____

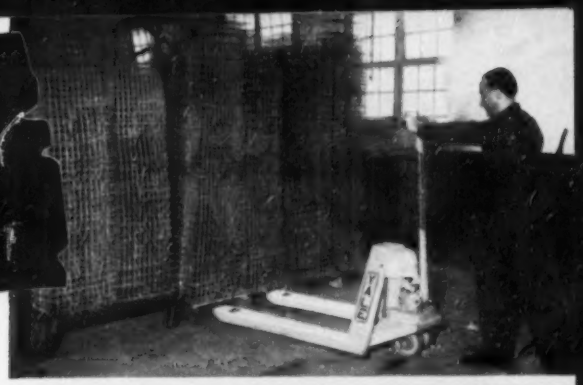
City _____ Zone _____ State _____

Company _____

Position _____ F-AM-50

This offer applies to U.S. only

TAKE HIGH HANDLING COSTS FOR A "RIDE!"

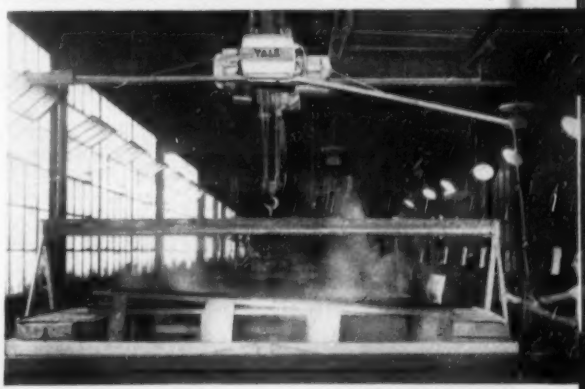


Handling adds nothing but cost to your products. By eliminating wasteful *rehandling*, you cut those costs substantially.

How to do it? Simply integrate efficient material handling machinery with the most practical handling system for *your* operations. Here's proof of what cost reductions can be made: a rubber company now saves $80,000 a year in a single department. Material transfer costs were lowered 25% by a publisher. $5.00 to $7.00 per ton was cut from handling costs by a casting manufacturer.

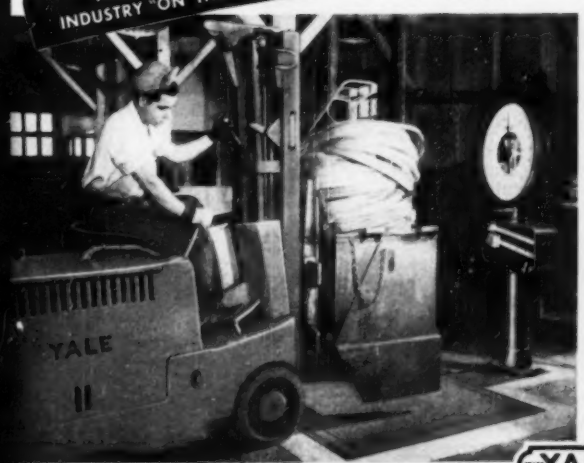
Whatever you lift, move and weigh, Yale Hoists, Trucks and Scales will give you handling economy you never thought possible. These cost-cutting tools handle enormous tonnage at a pace that keeps receiving, processing, warehousing and shipping at the peak of efficiency. They save a tremendous amount of human effort, improve safety conditions, and contribute greatly to worker morale.

See your telephone book for the name of the nearby Yale representative. Or write direct to headquarters for help in taking your handling costs for a "ride." Do it today.



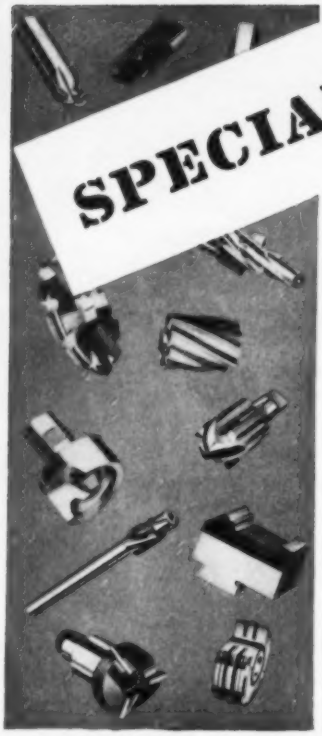
YALE
TOOLS THAT KEEP INDUSTRY "ON THE MOVE"

THE YALE & TOWNE MANUFACTURING CO.
Department L-96
Roosevelt Boulevard
Philadelphia 15, Pa.



YALE

MATERIAL HANDLING MACHINERY · hoists hand and electric · trucks hand lift and power · industrial dial scales



Cutting tools by Gorham are

just that!

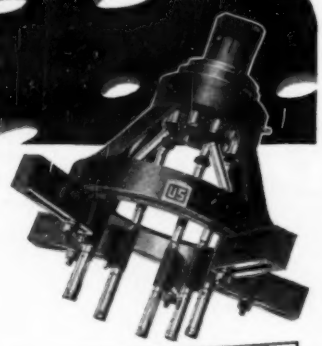
Whatever your needs in special high speed steel and carbide tipped cutting tools—you can be sure of one thing: The name GORHAM means top performance and lasting quality . . . the most for your money in any tool you buy. Long experience in the selection and heat treating of metals has put GORHAM in the front rank of America's leading tool makers. You can depend on GORHAM to deliver *special* service . . . you can count on GORHAM for *special* results! Specify GORHAM for all your cutting tool needs.

GORHAM TOOL COMPANY

14400 WOODROW WILSON • DETROIT 3, MICH.

Figure the HOLE Cost!

ADJUSTABLE
MULTIPLE DRILL HEADS
Fit any machine, 2 to 10 Spindles.
Save 2 to 10 Operations.



PRICES: 6" DRILLING AREA
¼ capacity
21/32 center

U-1	3 Spindle Head	$165.00
	4 " "	171.00
	5 " "	176.00
	6 " "	187.00
	7 " "	198.00
	8 " "	220.00

PRICES: 10" DRILLING AREA
½ capacity in cast iron standard
¾ special adaption in cast iron

U-2	3 Spindle Head	194.00
	4 " "	224.00
	5 " "	254.00
	6 " "	284.00
	7 " "	313.00
	8 " "	343.00
	9 " "	373.00
	10 " "	403.00

US HEADS
SINCE 1915

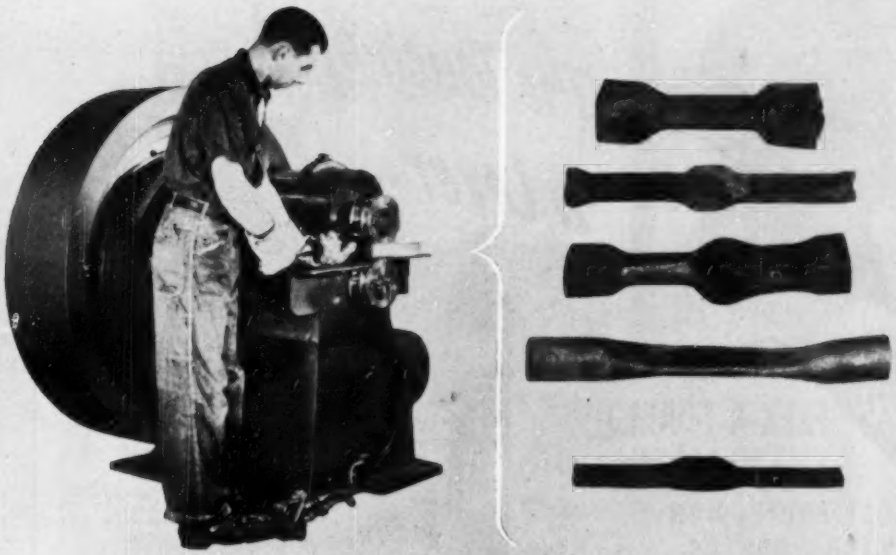
WRITE TODAY
For descriptive catalog.

IMMEDIATE DELIVERY!

Also manufacturers of all types of fixed center heads

UNITED STATES DRILL HEAD CO.

Dept. B, 616-618 Burns St., Cincinnati 4, Ohio



ELIMINATE FULLERING AND EDGING OPERATIONS!

You can now replace costly fullering and edging operations by fast, simple rolling on the new National Reduceroll.

Shown above at the right of the Reduceroll are typical examples of pre-formed forging blanks, ready for impression die forging on the same heat.

Advantages of the Reduceroll are:

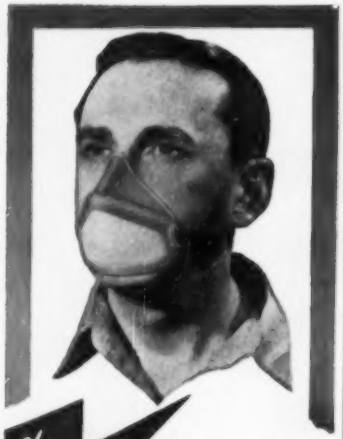
1. Increased production.
2. Unskilled operation.
3. Metal distributed accurately—minimizing flash.
4. Die life increased.
5. Uniform blanks free of shuts and folds.
6. Versatility—increases the range of your forging equipment.
7. Ruggedness—for large reductions in area.
8. Portability—for use as a "roving" tool.
9. Low-cost rolls quickly interchangeable.

Why not let us help you investigate the application of Reducerolling to your forging jobs?

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF
MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET AND WIRE NAIL MACHINERY

New York Detroit Chicago



New FLEX-A-FOAM FILTER MASK

DUST PROTECTION YOUR WORKERS WELCOME AND *WEAR*

No respirator does any good unless workers will wear it. Even if your men won't use old-fashioned respirators—cumbersome, grotesque, stifling—they're glad to wear the new Flex-a-Foam Filter Mask. Here's why:

- *It's a featherweight—only 1 ounce.*
- *It's snug and comfortable—adjusts to any face size.*
- *It's easier to breathe and talk through than a linen handkerchief.*
- *It's smartly styled—workers don't look or feel peculiar.*

FLEX-A-FOAM'S filter is a honeycomb of whipped foam latex that *keeps out non-toxic nuisance dusts as small as 1/25,000 of an inch!* Frames are of new DuPont Polythene plastic—so flexible they adjust themselves to any facial contours, yet so tough they're unbreakable in normal usage.

For new comfort, new efficiency—new economy, too—order Flex-a-Foam Filter Masks—lowest priced *quality* respirator on the market.

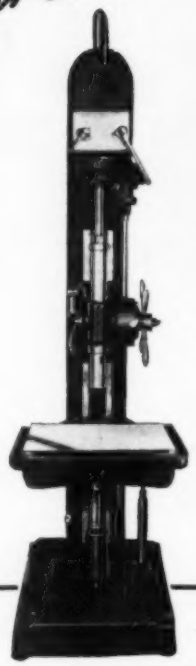
ATTENTION AGENTS AND JOBBERS
Your interest is invited

The Goggle Parts Company — Dept. A.
Cleveland 13, Ohio
Please send full information and prices on Flex-a-Foam Filter Masks.

Name_____
Position_____
Company_____
Address_____
City_____ Zone_____ State_____

THE GOGGLE PARTS COMPANY

The Touch of a Lever...



— GIVES YOU INSTANT SPEED CHANGE WHEN YOU DRILL WITH THE "RPMster"

No shutting off the motor, no delay at all when you want a different drilling speed! The operator simply selects the desired speed—instantly—by moving the control lever. The "RPMster" Variable Speed Drive does the rest. It's just one of many cost-cutting features in this and other "Buffalo" Drills which are setting production records all over the world. Write for the facts on stepping up your drilling profits!

BUFFALO FORGE COMPANY
509 Broadway, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
"BUFFALO" INDUSTRIAL DRILLS

THIS IS A GOOD PLACE TO DO BUSINESS WITH AMERICA'S BIGGEST INDUSTRY

NEW MARVIN MICROMETER BORING HEAD

A versatile precision tool of the highest quality, small in size, low in cost. Designed for use on Milling Machines, Drill Presses, Boring Machines or Lathes.

SPECIFICATIONS
- No. M-1000T.
- Cast iron body 2⅛"x1¾".
- Close fitting slide, adjusting screw to snug up slide or lock it.
- Slide has ⅜" travel.
- Dial graduates 1/1000".
- Hex socket for adjustment.

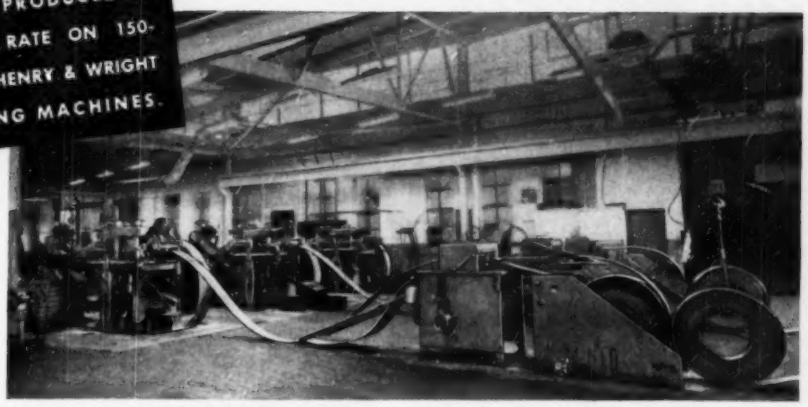
(Comes complete with the following equipment)
- 1-7/16"x3" boring bar.
- 1—solid tool bit.
- 1—No. 2 Morse taper shank.
- 1—⅜" straight shank.
- 3—wrenches.

Priced at $18.00 — Order yours today.

MARVIN MACHINE PRODUCTS, INC.
Sales Office: 414 FORD BUILDING, DETROIT 26, MICHIGAN

MINIMUM INVESTMENT ← → OPTIMUM PERFORMANCE

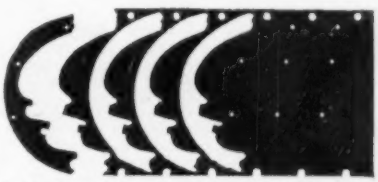
BRAKE STAMPINGS OUT OF 3/16" HOT ROLLED STEEL PRODUCED AT HIGH RATE ON 150-TON HENRY & WRIGHT DIEING MACHINES.



Kelsey-Hayes uses a battery of three 150-ton Henry & Wright Dieing Machines operating in conjuction with H & W Automatic Power Straighteners and H & W Cradle Reels.

Kelsey-Hayes Wheel Company, in its Jackson, Mich., plant is producing automobile brake components out of hot rolled steel up to 3/16" thick in excess of 100 strokes per minute. A tough and challenging assignment for progressive stamping, but taken in stride by the sturdy precision of Henry & Wright Dieing Machines.

There are presses that operate at high speed — but have a poor die life. There are others that give good die life — but operate at low speed. Only Henry & Wright Dieing Machines give you both high speed and long die life — a double feature that assures lowest cost production of stampings, with a minimum investment.



Brake shoe webs are stamped out in five steps — a typical example of complete-per-stroke production on H & W machines.

Complete-per-stroke production shoots out these rear brake emergency levers at high speed in six steps. Note operations performed.

Henry & Wright Dieing Machines do the work of 5 or more ordinary presses. Get more details by writing for our catalog.

Henry and Wright

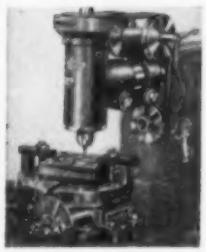
HENRY & WRIGHT

DIVISION OF HARTFORD-EMPIRE COMPANY

480 Windsor St., Hartford 1, Conn.

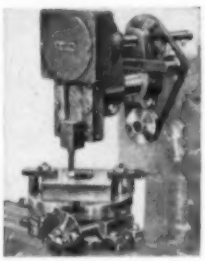
MARVIN

Machine Tool Attachments



MARTIN VERTICAL MILL ATTACHMENT. No. V-1200. A head combining simplicity and high performance with low cost. This HEAD CAN BE SET AT ANGLES, pulled out far past the travel of the table for large overhanging work. Simple to attach. Has a heavy spindle equipped with Timken tapered roller bearings which assures smooth operation at high speeds. Spindle nose takes end mills with ⅜" straight shank, up to ½" diameter cutter. Unit is machined to slip over 1½" overarm. Easily adapted to other size overarms. Height 7½". Price **$65.00.**

MARVIN ROTARY INDEX TABLE. No. 7-1102. A strong rigid precision table at a moderate price. The 6" table is graduated in degrees and has "T" slots for ⅜" bolts, with a bushing in the center. Table locks from the bottom. It cannot tilt. Cast iron worm wheel, hardened and ground worm (40:1 ratio). Worm can be disengaged. 3 index plates with 6 sets of holes each give a wide range of divisions. Hand wheel also furnished, graduated in ½ degrees. Height 2⅝" . . . which gives ample working space. Price **$93.00.**



MARVIN SLOTTING ATTACHMENT. No. S-1070. The Marvin Slotter can be quickly mounted. IT CAN BE SET AT ANGLES TO GET DRAFT ON DIES, etc. Can be pulled out past the travel of the table to handle large overhanging work. The stroke is adjustable from 0" to 2". Holder takes tools having ½" shank, machined to fit 1½" overarm by using a bushing or turning down a special overarm. Height is 7½", width 4½". Machines dies, squared or splined holes, internal gears, etc. Price **$82.00.**

MARVIN MACHINE TOOL ATTACHMENTS were designed by tool engineers whose practical experience in tool room procedure recognizes the necessity for Marvin units.

MARVIN rugged designing and precision engineering give you tool attachments of the highest quality at a new low price. Write today for complete information.

Copyrighted by H. B. Hazerodt 1949

MARVIN MACHINE PRODUCTS, INC.
SALES OFFICE 414 FORD BLDG. DETROIT 26, MICHIGAN

Are You Equipped to Hold Your Job?—To Get a New One?

The men who are holding good jobs today—who are not worrying about the period ahead—are those who have kept one jump ahead of their jobs. They are the men who are equipped with a thorough-going and growing knowledge of the business they are in.

It works in the metal working field as well as in any other. Some men fit themselves to do a little more than their job calls for. They fit themselves to do a little more than the other fellow. They make a steady effort to equip themselves with the best kind of a job insurance there is—KNOWLEDGE.

How about you? Do you know how quickly knowledge will pile up—how quickly you will become more valuable—if you spend a few minutes a day, regularly, studying sound books like the American Machinists' Library? Do you know how easily it can be managed paying only a few cents a day, while you use the books?

Thousands of men have followed this plan to win advancement or to make their jobs safe. You can too. Read about this Library and our 10 Day Examination Offer. Then send the attached coupon to us today.

New, Completely Revised and Enlarged

AMERICAN MACHINISTS' LIBRARY

6 VOLUMES 2987 PAGES OVER 2900 ILLUSTRATIONS

This library of machine shop practice was written for practical men. It gives you the best methods for every kind of machine shop work. It fully explains lathes, drills, and other machine tools and their operation, automatic screw machines, speeds and feeds, gear design and production, jigs and fixtures, punch and die work, metal surfacing, etc. All plainly written and fully illustrated.

What the Library gives you:

—complete guide for everybody interested in the operation of machines used in turning and boring practice

—description of all important varieties of machines, both manual and automatic, and methods of operating them

—data on speeds and feeds, new cutting alloys and materials, use of coolants, etc.

—practical information on grinding machines and abrasive wheels

—training in the various operations performed in drilling and surfacing materials in the machine shop

—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planing, shaping, slotting, milling and broaching

—exact, descriptive data on all aspects of gear-cutting practice, etc., etc.

No Money Down—Easy Payments

Let us send you this up-to-date Library for 10 days' examination, with no obligation to buy the books unless you want them. After 10 days, if you decide to keep the library, send $4.75 as the first installment and $4.00 monthly until $24.75 is paid. Otherwise return the set under no obligation. Invest in life's soundest commodity—KNOWLEDGE. Send the coupon today.

6 OUTSTANDING BOOKS

1. TURNING AND BORING PRACTICE—3rd Edit.
Gives the essential principles involved in turning and boring operations . . . a picture of the kinds of machines in use and methods of operating them.

2. DRILLING AND SURFACING PRACTICE—3rd Edit.
Useful information on drilling and surfacing tools, the machines in which they are used, and the methods of use which give best results.

3. GRINDING PRACTICE —3rd Edit.
How to use the right machine and method for each operation. New data added on the use of diamond abrasive wheels for cutting-off work, complete details on speed, wheel selection, precision grinding, etc.

4. GEAR CUTTING PRACTICE —3rd Edit.
Machines and methods for making gearing of different kinds and for checking accuracy. Includes standards adopted by the American Standards Association and the American Gear Manufacturing Association.

5. PUNCHES AND DIES —4th Edit.
Outlines development of die design; discusses use of metal stampings for complicated constructions, sectional dies and big press work, blanking operations, etc.

6. JIGS AND FIXTURES —5th Edit.
Explains the design and use of jigs and fixtures. Contains drawings of over 600 pieces available for adoption or adaptation. Emphasizes machines used, clamping methods, new standards for jig bushings, etc.

McGRAW-HILL ON-APPROVAL COUPON

McGRAW-HILL BOOK CO., Inc., 330 W. 42nd St., New York 18

Send me the **American Machinists' Library, 6 volumes,** charges prepaid, for 10 days' examination. If I find the books satisfactory, I will send you $4.75 in 10 days, and $4.00 a month until the special price of $24.75 has been paid. Otherwise I will return the books postpaid.

Name _____

Address _____

City _____ Zone _____ State _____

Company _____

Position _____ A-2-20-50

This offer applies to U. S. only.

Talide
(TUNGSTEN CARBIDE)
MEETS EVERY REQUIREMENT

BLANKING AND FORMING DIES
(For Stamping Lamination Discs, Metals, Plastics, Paper)

SPINNING AND CURLING ROLLERS

HEADING AND EXTRUSION DIES
(For Shaping and Sizing Bolts, Nuts, Screws and Collapsible Tubes)

TUBE MANDRELS

POWDER METALLURGY DIES
(For Compacting Powdered Metals and Materials)

DRAWING DIES
(For Wire, Tubing and Bar Stock)

PIERCING AND LAMINATION DIES

SWAGING DIES
(For Forming Solid and Tubular Shapes)

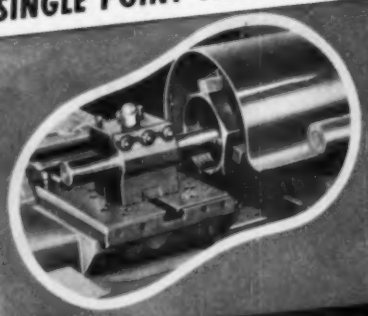
Runs of a Million or more

Improved shop practice reduces costs, helps meet competition. And you'll reduce costs with money-saving, time-saving Talide Dies that outwear steel dies at least 20 times, and on many occasions outwear them as high as 50 to 1. Too, down time of your equipment can be reduced by over 50% since Talide Metal needs little redressing. Made from hardest metal known, with great compressive strength, wear on Talide drawing dies after thousands of draws is almost negligible! Send for Die and Wear Part Catalog 48-WP.

SINTERED CARBIDES
METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION
YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*
CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

THE ADVANTAGES AND ECONOMIES of SINGLE POINT THREADING



MAIL THE COUPON for YOUR COPY!

ARE YOU . . .
like so many satisfied users,
TAKING ADVANTAGE
of the remarkable
THREADING ECONOMIES
made possible by the new Cri-Dan Single Point, Semi-Automatic High Speed Threading Machine?

SEND FOR THIS IMPORTANT BOOKLET
it tells you how you can reduce threading time from minutes to seconds!

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

Please send me your Bulletin 75-A on the Cri-dan Threading Machine.

Company_____
Address_____
_____
_____

There's big business in
JAPAN!
in imports and exports

Get representation in this profitable market!

We desire immediate contacts with U. S. Manufacturers and manufacturer representatives who want extra sales in Japan. We're particularly interested in chemicals, machinery and general merchandise. We also handle exports of Japanese merchandise. For reference contact National City Bank of N.Y., Wall Street, New York.

For exports, or imports please write to

E. OTT & CO. LTD.
701 Chiyoda Building
2. Chome Kyobashi Chuo-Ku
TOKYO
Branches in Singapore, Hong Kong and Canton

Cutting Costs...

How "Value Analysis" provides a practical, Fundamental approach to the problem of lower cost production.

Send for your copy of "How To Cut Costs With Value Analysis," now available in reprint form.

Reprints of this helpful *AMERICAN MACHINIST* Special Report are available at 15 cents each, or 13 cents each in quantities of 100 or more.

Write Reader Service Department

American Machinist
McGraw-Hill Bldg. N. Y. 18, N. Y.

GANSCHOW CUT GEARS

SPUR—SPIRAL
BEVEL—RACK
AND PINION

MEMBER OF AGMA

UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

GANSCHOW GEAR CO. • 14 N. MORGAN ST., CHICAGO 7.

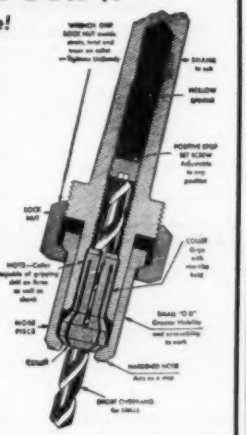
DRILL BREAKAGE

Reduced 86.7%

Here's How It Was Done!

Large automobile manufacturer, famous for production efficiency, gave us the following report of a test of the Erickson Collet Chuck. As a result of this test, manufacturer has standardized on Erickson Collet Chuck for this operation.

"Erickson chuck is used for drilling 1200 vent holes per day, average drill breakage one per day. We formerly broke from 8 to 10 drills with the ——— chuck. Now have average breakage of 2 drills per 900 oil holes drilled in pistons with 1/8" Erickson chuck. Had breakage of 15 drills per 900 holes using old drill sleeve method."



NO OTHER COLLET CHUCK ON THE MARKET

1. Delivers accuracy of .0005" TIR.
2. Permits collapse of 1/32" (Replacing 7 standard single purpose collets.)
3. Grips drills on flutes—permits stubbing.
4. Gives such positive grip due to exclusive surface contact.

Learn How This Efficiency Can Be Yours, Too!

Send for complete data on Erickson holding equipment now and learn how Erickson tools applied to your problems can boost production and reduce costs.

See Our Exhibit, Booth 240, TOOL ENGINEERS INDUSTRIAL EXPOSITION, Philadelphia, April 10-14.

ERICKSON TOOLS DIVISION

2302-A Hamilton Ave. Cleveland 14, Ohio

WHEN ACCURACY COUNTS...

Contact SCHERR!

Consider these time Saving Features in

CHESTERMAN HEIGHT GAGE

1. LARGE SOLID BASE
2. RIGID TRIANGULAR SCALE
3. EASY READING 2 1/2" VERNIER
4. MILLIMETER AND INCH GRADUATIONS
5. FINE ADJUSTMENT THRU BASE ON SCREW

AVAILABLE IN 12 • 18 • 24 • 40 & 48"
WRITE FOR ILLUSTRATED FOLDER

GEORGE SCHERR CO., INC.
COMPLETE LINE OF PRECISION INSTRUMENTS
200-D LAFAYETTE ST. • NEW YORK 12, N.Y.

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to 3/4" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

BUZZER *Gas* BURNERS

NO BLOWER OR OTHER POWER NEEDED!

. . . JUST CONNECT TO GAS SUPPLY.

Designed to solve innumerable Heat applications. Unexcelled for efficiency, economy, simplicity, and flexibility.

The Complete "BUZZER" catalog shows Gas Burners, Furnaces, and other equipment. Write for your copy today.

CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

3 *important* books on TOOL DESIGN

written for you by an expert

TOOL DESIGNERS will tell you that every book on tool engineering by C. W. Hinman is a **"MUST"**

See them 10 days FREE

DIE ENGINEERING LAYOUTS AND FORMULAS

A practical toolroom engineer brings you in this book the gist of his *40 years' experience* in interchangeable manufacture. Here are drawings and photographs with detailed explanatory text of 90 percent of all the key designs used in tools for presswork. Includes all the necessary mathematical formulas for laying out the assembled dies in a clearly rendered drafting technique—shows dies for producing equipment that reveals basic principles of many key designs that have wide application in fabricating an endless variety of small precision parts—shows you the drafting shortcuts that war production has worked out. *497 pages, 311 illustrations, $5.50.*

PRESSWORKING OF METALS

A valuable reference for the design of press tools and the fabrication of metals in power presses—a reliable source for everyday use on bench, desk or drawing board. Gives numbers of basic designs, each of which embodies the means of simplifying presswork, improving results, saving material, cutting costs, or accomplishing difficult operations. From them toolmakers and designers can get endless ideas for solving specific problems of their own. *443 pages, 423 illustrations, $4.50.*

PRACTICAL DESIGNS FOR DRILLING, MILLING AND TAPPING TOOLS (Second Edition)

A practical manual demonstrating the best methods for designing, drafting, and using drilling jigs, and tapping and milling fixtures, illustrating the fundamental principles by which all tools must be designed for successful operation. With a wealth of detailed operational functions of tools, mathematical formulas, tool engineering tables, etc., it supplies all the essentials of designing and drafting tools and gives many new ideas for doing machine work and for designing tools. This thoroughly revised edition presents much data on recently improved production techniques and includes helpful new material on the most effective use of tapping tools. *416 pages, 446 illustrations, $4.50.*

***All 3 books by* C. W. HINMAN**

Former Chief of Jig and Fixture Design, Western Electric Co., Chicago; former Chief Tool Engineer, Automatic Electric Company, Chicago.

Examine them 10 days FREE — Mail this coupon!

McGRAW-HILL BOOK CO., INC., 330 W. 42nd St., NEW YORK 18, N. Y.

Send me the books checked below for 10 days' examination on approval. In 10 days I will pay for the books, plus few cents for delivery, or return them postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

- ☐ Hinman—Die Engineering Layouts and Formulas, $5.50.
- ☐ Hinman—Presswork of Metals, $4.50.
- ☐ Hinman—Practical Designs for Drilling, Milling and Tapping Tools, $4.50.

Name .....

Address .....

City .....Zone.....State.....

Company .....

Position A-2-20-50

This offer applies to U. S. only.

BRITISH REFRIGERATION MANUFACTURERS

Of Domestic Absorption Units operating on Bottle Gas, Kerosene & A.C. or D.C. Electricity, wishes to contact Domestic Refrigerator Box Manufacturer with the view to marketing a Domestic Refrigerator to the general public at approximately 100 dollars.

Those interested should contact company's export Director now in Canada and United States at the following addresses:

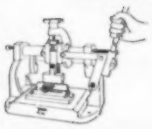
W. J. E. LEE, (Export Director)
Le Bryan Group Products (Gt. B.) Ltd.,
c/o Manhattan Towers Hotel,
Broadway at 76th Street, New York 24

or

c/o Mr. Breslin,
Suite 3,
470 St. Alexis Street, Montreal 1.

MARK ROUNDS or FLATS

WITH THE MODEL 9A MARKING MACHINE, COMES IN HAND, MOTOR AND AIR DRIVEN MODELS.



If you make precision parts you need the 9A machine.

The ACROMARK Company

7-13 MORRELL ST., ELIZABETH 4, N. J.

ATLANTIC GEARS

SPUR-SPIRAL-WORM-BEVEL GEARS GENERATED WITH PRECISION ON MODERN EQUIPMENT • SEND SAMPLES OR BLUEPRINT FOR QUOTATION!

ATLANTIC GEAR WORKS, INC. Call
200D LAFAYETTE ST • N.Y. 12, N.Y. CA 6-1440

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

Famous for H&G DIE HEAD

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

See our Advt. on Page 39 Feb. 16, '50 American Machinist

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 854 N. San Pedro St., Los Angeles California.* Canada: *F. F. Barber Machinery Co., Toronto, Canada.*

SEE THE PIONEER
COOLANT AND LUBRICANT PUMPS
AT THE A.S.T.E. SHOW

PIONEER Pumps
HIGH EFFICIENCY • LOW POWER CONSUMPTION
GREATER VOLUME AND LESS MAINTENANCE

PIONEER PUMP & MANUFACTURING CO.
19651 JOHN R STREET • DETROIT 3, MICHIGAN

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4070

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips MEANS MAXIMUM CUTTING EFFICIENCY

Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under license issued by John Milton Luers Research

CENTERING
MACHINES
• HAND • SEMI AUTOMATIC • AUTOMATIC
Special Machinery
HEBERT Equipment Co. • Romeo, Mich.

BAUMBACH *The* BEST IN DIE SETS
Write for circular

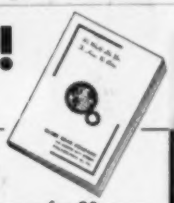
Being originators of Standard Die Sets naturally we are steps ahead in Design—Precision—Dependability and Economy. Because Baumbach Die Sets have demountable Leader Pins and Bushings, Die Set inventory is reduced as well as costly machining time. Learn about Baumbach superiority before you buy.

E. A. BAUMBACH MFG. CO., 1334 S. Kilbourn Ave., Chicago 23, Ill.

GEAR CUTTING MACHINES
Well designed . . . good features . . . create production advantages.
NEWARK GEAR CUTTING MACHINE CO.
69 PROSPECT ST., NEWARK 5, N. J.
Represented by:
Pratt & Whitney . . . head office, West Hartford, Conn.
John Bertram & Sons Co., Ltd. . . . head office, Dundas, Ontario, Canada.
Alfred Herbert, Ltd. . . . head office, Coventry, England.

Precision Die Made—Lowest Possible Cost.
DAYTON ROGERS MFG. CO., Minneapolis 7, Minnesota

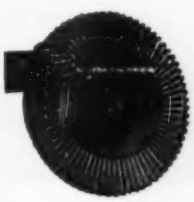
A REAL HELP!
NEW GEAR BOOKLET



Here is a brand-new, handy reference booklet, to help you select the right gear. Prepared by Globe Gear Company, makers of quality gears for 30 years.

Send request on company letterhead today.

GLOBE GEAR COMPANY
719 North 24th Street
Philadelphia 30, Pa.



BILGRAM
QUALITY
GEAR

ALL TYPES • ALL MATERIALS
BILGRAM GEAR & MACHINE WORKS
1217 Spring Garden, Philadelphia, Pa.

AUTOMATIC CAM ACTUATED BRAKE OF

PRESS-RITE

POWER PRESSES

STOP . . . the press automatically at "top center" with a brake that is cam actuated. Braking power is adjusted by the same simple conventional method used in ordinary constant drag brakes and can be instantly set to compensate for various weights of dies used. With cam actuation, constant drag is eliminated and full motor power is utilized to turn out more work at lower cost.

Other cost cutting features of Press-Rite Presses include:

- **Exclusive non-repeat safety mechanism**
- **Triple ramway lubrication**
- **Heavy duty reinforced frame**

See them at your dealer today

WRITE FOR BULLETIN P-250A

6 MODELS
5 to 30 TON
CAPACITIES

Sales Service Machine Tool Co.

PRESS RITE PRESSES · SHAPE RITE SHAPERS · KELLER POWER HACK SAWS

2347 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

How

MATERIALS HANDLING
Affects Plant Layout

Materials handling is the greatest single item of indirect factory expense in the average metalworking plant. The Special *American Machinist* Report, "How Materials Handling Affects Plant Layout," discusses prime requisites of good layout and effective handling . . . offers selected case histories . . . covers the subject from the standpoint of both entire plants and individual departments.

Sixteen pages; 25c per copy

READERS' SERVICE DEPARTMENT

American Machinist

McGraw-Hill Building **New York 18, N. Y.**

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT + BUSINESS EQUIPMENT — USED OR RESALE

OPPORTUNITIES

EXECUTIVES INTERESTED IN CHANGING POSITIONS

Make use of our continuous nationwide contacts. We offer a unique, confidential & discreet service to Executives desiring to contact employers. Write for details.

MUTUAL POSITIONS PLAN ASSOCIATION
55 William St., New York 5, N. Y.
(A Mutual, Non-Profit Membership Organization.)

HYDRAULIC OR MECHANICAL ENGINEER

Designer with experience in application of hydraulics to machine tools. Position open with well-established New England concern. In reply, please give full details of experience and background.

P-2284, AMERICAN MACHINIST
330 W. 42 St., New York 18, N. Y.

WANTED SUPERINTENDENT

Aluminum and zinc die cast plant in Western Michigan employing 75 men. Must be acquainted with die design, production methods and maintenance problems. Give particulars as to age, experience and salary expected.

P1629 AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

ABRASIVE SALES ENGINEER WANTED

One of the country's largest grinding wheel manufacturers has an opening in the State of Ohio. Familiarity with abrasive products and their uses desirable but not essential. Apply by letter giving age, education, experience in detail, etc. All applications will be kept in strict confidence. Write

SW-2297, AMERICAN MACHINIST
330 W. 42 St., New York 18, N. Y.

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 40 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

POSITIONS WANTED

SUPERINTENDENT OR Master Mechanic with 25 years' experience in machinery manufacturing desires connection with large or small concern located in Northern New England. Please write for resume of past experience. PW-2057, American Machinist.

MECHANICAL ENGINEER: Member of A.S.M.E.; age 48; Married; Registered Graduate Engineer, now employed, desires change for a more responsible position as Mechanical or Assistant Chief Engineer. Twenty years of diversified mechanical experience involving Design, Testing, Patent Developments, Inspection, and Administration Duties. Will travel if necessary. Address PW-2112, American Machinist.

MAINTENANCE SUPERINTENDENT practical machinist and tool and die. Fully experienced Supervisor. Knowledge of welding and all types of machine and repair work, cost reduction on work. Organizer for production and training of unskilled mechanics. PW-1959, American Machinist.

YOUNG MACHINE, Tool and Die Designer seeks position with progressive medium sized concern. Fine record showing high degree of ingenuity, reliability and efficiency. M.E. Grad. Locate anywhere. PW-2206, American Machinist.

INDUSTRIAL ENGINEER, licensed, doing consulting work desires executive type position with private industry. Background varied, strong in cost reduction experience. PW-2221, American Machinist.

SELLING OPPORTUNITY WANTED

AM INTERESTED in Contact-Sales and Agency work for reputable machine tools, accessories or mechanical products. Must operate from South West for family reasons. Over 15 years experience, precision manufacturing—now plant mgr. RA-2239, American Machinist.

CONTRACT WORK AVAILABLE

Wanted: Manufacturer

for patented B-X connector, forming or die cast fabrication. A proven item. U.L. recommended. CWA-2263, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office, Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel, Registered Patent Attorneys, Suite 455, 815-15th Street, N.W., Washington 5, D. C.

NEW ADVERTISEMENTS

Copy must be received by February 20th to appear in the March 6th issue.

FOR SALE

Patents #2428439 a two points at once sawset and #2427754—2490244 an automatic saw-sharpener.

C. WAHLSTROM
1441 Roosevelt Ave., Redwood City, Calif.

WANTED

WANTED IMMEDIATELY

8" SELLERS Horizontal floor type boring mill, with or without floor plate. Spot cash payment for quick delivery. Telephone VAnderbilt 6-0560, or write or wire Room 1100, 2 West 45th Street, New York 19.

WANTED
THREAD COMPARATOR

Jones and Lamson, Model PC-14. Must be in good condition.

T. H. MacDonald, AVICO, INC.
P. O. BOX 1090 PORTSMOUTH, R. I.

WANTED

No. 5D or 5DE Potter & Johnson Auto. Lathes.
Vertical Shaper with 30" dia. table.
No. 2G B. & S. Automatic, 1½" cap.
#2K Milwaukee Horizontal Plain Miller.
#3A Warner & Swasey Universal Turret Lathe.
(All Must Be Late Type)

JULIUS J. SCHNEIR & CO.
103 N. DESPLAINES ST., CHICAGO 6, ILL.

WANTED
BALANCING MACHINES
THE MacDELL CORPORATION
1042 West Lake St., Chicago 7, Ill.

CONTRACT WORK

Small or large orders wanted for

PRECISION METAL PARTS

by well equipped machine shop with Low Overhead

Bar work to 2½". Chunking work to 12". Precision work to Navy tolerances. Complete tool room; bench facilities; turret and engine lathes; millers; oil groovers; welding; skilled labor. Can assist in design or modification of product for lower cost or mass production. Engineering cooperation at your service.

FRANCIS *Metal Products Corporation*
P. O. Box 155 PALMYRA, N. Y.

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
GENERAL PATTERN WORKS
Cincinnati, Ohio

FOR SALE

Cone Automatics 4 spindle 3½" cap. motor driven
Cone Automatics 4 spindle 1¼" cap. motor driven
2—Bullard Multamatics 8" six spindle
1—Gray 36x36x8' three head planer motor driven
250 other machines in stock

THE STATE MACHINERY CO., INC.
865 CONGRESS AVENUE
NEW HAVEN, CONN.

For Sale
DIEING PRESSES
2—25 TON HENRY & WRIGHT Double Roll Feed, Scrap Cutter, M.D.—A-1 Cond.
SEABOARD STEEL CO., INC.
New Haven, Conn. 8-0929

MACHINERY FOR SALE
ATTENTION EXPORTERS!

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12" Gleason Generators, 36 BM Gould & Eberhardt Rougher, #7 Fellows Gear Shaper, #10 D. E. Whiton Machine. Write for full information.
FS-1033, AMERICAN MACHINIST
330 W. 42 St., N. Y. 18, N. Y.

GUARANTEED TOOLS

20"x96" cc AMERICAN 12 Speed Timken Head Lathe, taper, rapid trav., 1938
30"x144" cc NILES "Timesaver" Lathe, 1941
48"x20' cc BETTS BRIDGEFORD, 1941
#2 CINCINNATI Tool & Cutter Grinder, 1941
10"x48" NORTON "C" Cylindrical Grinder, 1942
20"x96" NORTON "A" Cylindrical Grinder
08 CINCINNATI Mill, Plain, like new
4' HAMMOND Jackknife Radial, 1942
5' CARLTON Radial, 7' arm
36"-42" BULLARD New Era Vertical Turret Lathes

O'CONNELL MACHINERY CO.
1825 NIAGARA ST. BUFFALO 7, N.Y.

BALANCING MACHINES

Completely Rebuilt

Guaranteed to perform and hold tolerance equal to a new machine.

Gisholt 3U Dynetric Balancing Machine
Gisholt 1S Dynetric Balancing Machine
Gisholt 12E Static Balancing Machine
Annis Model M-1 Dynograph Balancer

We would be pleased to discuss your balancing problems with you.

THE MacDELL CORPORATION
Specialists in rebuilt balancers
1042 W. Lake St. Chicago 7, Ill.

Metal Forming and Beading Machine
#206-F Toledo 15S Toe D.C. Press, 3" Stroke, 28" x 110" Bed Area
#6-D Potter & Johnson Turret Lathe
12 Spindle Moline Automatic Drilling Machine
3 Spindle Moline Model 7-D Cylinder Borer
1-A W&S Universal Turret Lathe
30"x14' Schumacher & Boye Engine Lathe
Libby 28"x4½" Spindle Turret Lathe
28" Stockbridge Shaper
Lees-Bradner CT 36" Thread Millers
Crankshaft Grinder
Foote-Burt 4 Spindle Drill #2 M.T.
24"—H.S. Milling Cutters (New)

CONTINENTAL SALVAGE & MACHINERY CORPORATION
1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

P & W No. 12B 2-spindle Profilers.
Lipe Curbo 12"x18" Mechanical Lathes, 1945.
National Acme Model TR-1 Thread Roller, 1946.
Reed-Prentice No. 11½G Die Casting Machine.

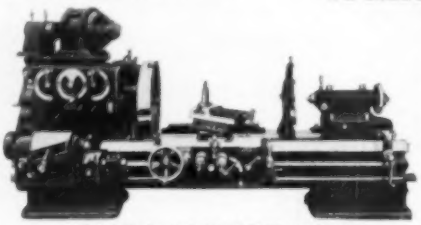
D. E. DONY MACHINERY CO.
47 Laurelton Rd., Rochester 9, N. Y.

FOR EVERY BUSINESS WANT
"Think Searchlight *First"*

EASTERN OFFERS FROM STOCK

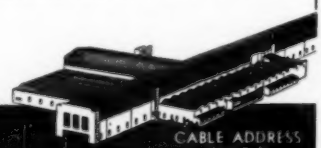
ENGINE LATHES

10x20" centers Monarch EE Geared Head, m.d., latest
10x24" Logan, cone, motorized
12x30" centers American Geared Head, m.d., late
13x30" centers Pratt & Whitney Model B, m.d., taper
13x48" centers Pratt & Whitney Model B, m.d.
14x30" Lodge & Shipley Selec. Head, m.d., latest
14"x54" centers Lodge & Shipley, m.d., latest
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' Lodge & Shipley Geared Head, m.d.
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Prentice, m.d., taper
14"x8' Pratt & Whitney, cone
14"x102" centers LeBlond, m.d. in leg, latest
15"x8' LeBlond Geared Head, m.d.
16"x30" Rood-Prentice, m.d., latest
16"x36" Pratt & Whitney Geared Head, m.d.
16"x38" Centers Pratt & Whitney, cone motorized
16"x6' Bradford, cone
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' bed LeBlond, cone
16"x6' Lodge & Shipley Selec. Head, m.d.
16"x6' bed Monarch Geared Head, m.d.
16"x8' bed Lodge & Shipley, m.d.
16"x8' Monarch, m.d. in base, taper
16"x10' Hendey Yoke Head, taper
16"x14' American Geared Head, m.d.
16"x14' Greaves-Klusman, m.d. in leg, taper
17"x6' LeBlond Geared Head, m.d.
17"x6' LeBlond Geared Head, m.d., taper
18"x48" centers Lodge & Shipley, m.d., taper
18"x32" centers American Geared Head, m.d., taper
18"x5' LeBlond Geared Head, m.d.
18"x6' bed Lodge & Shipley, cone, motorized
18"x5' Monarch Geared Head, m.d.
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d.
18"x8' Champion, cone
18"x8' Hendey Geared Head, m.d.
18"x8' Lodge & Shipley Selec. Head, m.d.
18"x8' Lodge & Shipley, cone
18"x8' Whitcomb-Blaisdell Geared Head
18"x10' Bradford, cone, motorized
18"x10' Cincinnati, cone
18"x10' Lodge & Shipley Selec. Head, m.d.
19"x8' bed LeBlond Geared Head, m.d., taper
19"x10' LeBlond Geared Head, m.d.
20"x40" centers Pratt & Whitney Model B, m.d. in base, taper
20"x8' American Geared Head, m.d., taper
20"x8' Cincy, cone
20"x10' bed (60" centers) Monarch Geared Head, m.d., taper
20"x10' Sidney Geared Head, m.d.
20"x11' Lehmann Geared Head, m.d., taper
20"x14' bed Lodge & Shipley Selec. Head, m.d., taper
22"x70" centers Greaves-Klusman Geared Head, m.d., taper
22"x8' Lodge & Shipley, cone
23"x12' LeBlond Geared Head, m.d., taper
23"x18' LeBlond Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x10' American, cone
24"x10' Greaves-Klusman Geared Head, m.d., taper
24"x10' Lodge & Shipley, cone
24"x12' Bridgeford Geared Head, m.d., taper
24"x12' LeBlond, cone
24"x12' Monarch Geared Head, m.d., taper
24"x20' Lodge & Shipley Selective Head, m.d., taper
25"x10' LeBlond, cone
26"x8' Bridgeford Geared Head, m.d.
26"x12' Bridgeford Geared Head, m.d., taper
30"x12'6" Niles-Bement-Pond, m.d., taper
30"x13'6" Niles-Bement-Pond, m.d.
30" raised to swing 42"x21'0" American Geared Head, m.d., taper, Timken
32"x12' Lehmann Hydratrol Geared Head, m.d., taper, Latest
36"x36'0" Niles Heavy Duty, m.d., latest, 2 carriages



30" AMERICAN G.H. LATHE, 12 SPEED

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.



THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio — MElrose 1241
CABLE ADDRESS EMCO

UNUSUAL VALUES

Milling Machines—No. 1 Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—36" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36" Surface 12"x52", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x5', 8', 10'—16"x5', 8', 10'—18"x8', 8', 10'—20"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 10" and 18" bench and floor type.

Planers—Single head 24"x8', 24"x8', 30"x8'.

Shapers—16", 20", 24" B.G. crank.

Turret Lathes—J & L 2"x36"—3"x36" also Acme, W. & S. Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motor-fized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. Box 88, Columbus 16, Ohio

ALL PRICES DRASTICALLY REDUCED!!

All Late Type

Bullard Multaumatics, 16", 12", 8", late
#42 Lucas Boring Mill 4" bar, '42 new
#28/60 Vertical Cincinnati Hydrotel, '44
2300 ton Bliss Hydraulic Press, sacrifice, late!
#2, #3 Cinci. Dial type, Univ. Mills
6'17" Columa American Hole Wizard Radial Drill, AC Motor on Arm
5" Fisher Horiz. Floor Type Boring Mill, Late
5" Bar Table type boring mill, Giddings & Lewis #350T
#12 Brown & Sharpe Production Mills, 48½" x12" table size, $2250.00 ea.
#18 Blanchard Surf. Grinders 36" chuck, late type.
9/16", 1", 1¼", 1⅝", 2¼", 2⅝" RA6 Acme Gridley Auto.

SPOT WELDERS & BRAKES

All sizes spot welders, air & foot operated. 25% off list price.
Hand Brakes all sizes up to 10'

MONA
PAULS MACHINERY COMPANY
6111 Vermont Ave. — Detroit 8, Mich.
Phone: TYLER 7-6300

Bor. Mill, Hor. 4½" Bar N-B-P
Bor. Mills, Vert. 24"-30"-42"-60"-72"
Drills, Radial, 3'-4'-5'-6' Cin.-Bick.
Grinder Surface, #2 Diamond, Mag. chuck.
Lathes, Turret, 3A W. & S., and 24" Gisholt.
Millers, Plain, No. 3, 4, & 5-B Cincinnati.
Millers, Vert. No. 3 & 4 Cincinnati.
Shaper, Draw Cut, 30" Morton.
Swager, #3 Etna, 1½ tubing.
West Penn Machinery Company
1210 House Bldg. — Pittsburgh, Pa.

HORIZONTAL BORING MILLS

$33 Lucas, 4½" bar, equipped with heavy OVERHEAD VERTICAL MILLING ATTACHMENT, 36" ROTARY TABLE; extra width, extra height; brand new leadscrews and nuts for the head; 10 hp motor; excellent.

3" bar UNIVERSAL "Tri-Way", standard machine, 1942.

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St. Providence, R. I.

NEW CINCINNATI BRAKE AND SHEAR

1 Series 130 x 10 ft., 3/8" x 10 ft. capacity Press Brake.
1 Series 2510—3/8" x 10 ft. capacity Shear.

Immediate Delivery

SALES SERVICE MACHINE TOOL CO.
2363 University Ave., St. Paul, Minn.

FOR SALE

24K MILWAUKEE PLAIN HIGH SPEED MILLING MACHINE, SERIAL #1-3172. With Arbor, Arbor Supports, 24" Rotary Table.
PRICE **$6,000.00**

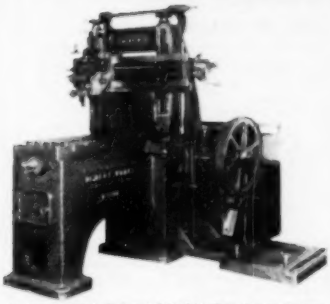
PRACTICALLY NEW AT
WINSTON MACHINERY CO., INC.
517 So. Delaware St., Indianapolis 4, Ind.

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Niles, Bement & Pond 20"x20"x24" Motor Driven Planer-Shaper. 16"x40" table. Swivel head on crossrail. 220/440 motor.

TURRET LATHES

Bardons & Oliver #1 Electric Turret Lathe. ¾" cap. Has bar feed & collets.
Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed 1½".
W-Swasey #3 Univ. 1½" cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.
Warner & Swasey #1A Universal Heavy Duty Saddle Type Turret Lathe. Serial #648220. Capacity —2½" rd., Gr. Hd. 12 speeds. Coolant system, bar feed, chuck & tooling. Immediate delivery.

Leach 6"x12" Horizontal Surface Grinder. NEW. 2-Speed Ball-Bearing Spindle. Motor in cabinet base. Immediate delivery from stock. 3-60-220 Volts.

LATHES

36"x30' LeBlond Q.C.G. Hvy. Duty Grd. Hd.
26"x14' Lodge & Shipley Q.C.G. Taper.
25"x14' LeBlond, Taper Att. Motorized.
24"x16' American, 11' C.C. Taper Att.
24"x8' Lodge & Shipley, Q.C.G. Motorized.
22"-46"x10' Q.C.G. Putnam Extension Bed Gap.
22"x10' LeBlond, Q.C.G. Motorized.
20"x18' American Q.C.G. Grd. Hd. Taper Att.
20"x10' Hendey Q.C.G. Taper Att. Motorized.
20"x10' American, Q.C.G. Motorized.
18"x8' Hendey, Q.C.G. Motorized
18"x6' American Q.C.G. Grd. Hd. Taper Att.
18"x6' Monarch Q.C.G. Grd. Hd. Motorized.
16"x8' Hendey Q.C.G. Taper Att. Motorized.
14½"x6' South Bend Enclosed Head, Motor Driven.
14"x8' Hendey, Q.C.G. Taper Att. Motorized.
14"x8' Reed-Prentice Grd. Hd. (REBUILT)
14"x7' Hendey Q.C.G. Motorized.
14"x6' Hendey Q.C.G. Taper Att. Motorized.
12"x6' Hendey Q.C.G. Taper Att. & Equipment.
12"x5' Hendey Q.C.G. Taper Att. & Collets.
11"x3' South Bend, Q.C.G. Motorized.
10"x24" Logan Q.C.G. #825—(NEW)
10"x24" Logan Q.C.G. #820—(NEW)
9"x15" Porter-Cable Grd. Hd.

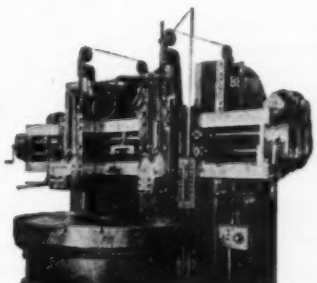
GRINDING MACHINES

Cincinnati 6"x18" Hydraulic Cylindrical. FILMATIC BEARINGS. Built-in Controls.
Cincinnati 10"x36" Plain Hydraulic Cylindrical Model #EA. Serial #5P2D1L-19. Filmatic Bearings. Built-in Electrics. Hydraulic Infeed.

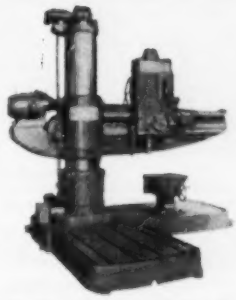
Cincinnati #2 Cutter & Tool Grinder. New in 1943, Equipment includes Motor Driven Cylindrical Grinding Attachment.

BORING MILLS

3⅛" bar Giddings & L. Horiz.
5" bar Barrett #2 Cylinder. Boring.
8" bar Barrett #6 Cylinder. Boring.
Ryerson #11 Horiz. 3" Capacity, #6 M.T.
24" Bullard Vertical, Motorized.
42" Bullard Vertical, Motorized.
54" Bullard Vertical, Motorized.
42" Gisholt Vertical, Motorized.
120" Niles, B & Pond Vertical



Betts 100" Vertical Boring & Turning Mill. 1944 machine. 2 plain heads. Complete Electrical.



Cincinnati-Bickford 6'-19" SUPER-SERVICE Radial Drill. New in '42. Standard base plus angle base. 36 spindle speeds. Necessary motors & controls.

RADIAL DRILLS

Cinci-Bickford 6' Arm, 15" Col. 24 Speeds.
Cinci-Bickford 5' Arm, 13" Col. 24 Speeds.
Cinci-Bickford 4' Arm, 13" Col. 32 Speeds.
Cinci-Bickford 3' Arm, 9" Col. 12 Speeds.
Cinci-B. Super-Service 4'-11". 24 Speeds
Mueller 3'-11" Universal. M. Dr. #4 M.T.

MILLING MACHINES

Milwaukee #2B Dble. Overarm, Horiz.
#1M Cincinnati Horiz. Rect. Overarm.
#3 Dial Type, H.S. Cincinnati Vertical Mill.
#2, #3, #4 Cincinnati High Power Vert.
#4-36 Cincinnati 4-Spdle. Duplex Hydromatic.
#4-36 Cincinnati Plain Hydromatic.
Sundstrand #0 Hydraulic Feed Rigidmill.
Cincinnati #0-8 Automatic Horizontal.
Cincinnati #0-8 Vertical.
Cincinnati #2-18 Automatic Horizontal.
Brown & Sharpe #12 (Electrics Built-in) 24".
Nichols Hand Mills (Late Type).
Van Norman #3V Ram Type Vertical Mill.

UNIVERSAL MILLING MACHINES

B & S #2, 20"x5"x17½".
B & S #1½, 20"x7"x18'.
Bridgeport, 20"x9"x16" Turret Type.
Garvin #2MU, 24"x8"x18".
Kempsmith #2, 28"x8½"x18".
Cincinnati #2M, 28"x10"x18".
B & S #3, 34"x10"x21".
Cincinnati #35 34"x12"x20".
#4 & #5 Cincinnati High Power Horiz.

PUNCH PRESSES

O.B.I. Toledo #5, 44 tons cap. motor dr.
O.B.I. Bliss #18, 19C, 20, 20B, 21 motorized.
O.B.I. Michigan, 36 tons cap. Wide ram & bed.
#68C Bliss Dble. Action 3-Crank.
#91C Toledo Sgle. Act. Dble. Crank S.S.
#305 Bliss S.S.S.A. 95 tons Cap.
#3A Bliss S.A.S.S. Dble. Crank. 42 Tons.
Zeh & Hahneman 35 Tons S.A. Cam Release Spring Return. 220/440 motor.

NEW 80 PAGE CATALOG MAILED FREE UPON REQUEST

UNITED "SELECT" TOOLS

DRILLS

CINN.-BICKFORD 24" Box Col. Super Service Upright Drill, M.D. 220/3/60, Coolant, Compound Table

CANEDY-OTTO 21" Box Column Upright, Coolant
CINN.-BICKFORD 28" Box Col. Super Service Upright, M.D. 220/3/60, Compound Table, new 1947
CINN.-BICKFORD 5'15" Col. Super Service Radial
LELAND-GIFFORD #1LMS—6 spindle, Coolant
LELAND-GIFFORD #2LMS Single Spindle, Hyd. & Mech. feeds (3)

GRINDERS

LANDIS 10"x48" Type C Hydraulic Cylindrical Grinder

CINN. #2 Centerless, Filmatic, Thru and Infeeds (2)
DETROIT Tap Grinder, new 1947
LANDIS #4H (4"x12") Hyd. Plain, Plunge Cut
LANDIS 10"x24" Hyd. Type C Universal
NORTON 6"x18" Type C Hydraulic Plain (2)
NORTON 12"x36" Hyd. Type C Multi-Purpose Universal
NORTON 6"x10"x36" Opposide Surface
REID #2B Auto. Feed Surface (6"x18") Excello Spindle
ROBOT 6"x18" Auto. Feed Surface (2)
SELLERS Model #6T Wet Tool
WARDWELL Flute Grinder, new 1947

GEAR MACHINERY

GLEASON 12" Straight Bevel Gear Generator, new 1941, used very little—priced right

GOULD & EBERHARDT 12" Universal Gear Hobber
HANSON-WHITNEY 8"x16" Universal Thread Miller, relieving attachment
LEES-BRADNER #40 Chucking Thread Miller

LATHES

MONARCH 10"x20" Model EE Toolmaker's Engine Lathe, Vari-Voltage drive

BRIDGEFORD 36"x84" cc Geared Head, Engine
SOUTH BEND 16"x8' Proc., Taper Attach., Collets, Chuck

TURRET LATHES

WARNER & SWASEY #3 Ram Type Universal, 1½" cap., Bar Feed, Collets, Taper Attachment, Serial number over 749,000, 2-speed motor.

GISHOLT #3R Saddle Type, 5½" Cap., Bar & Chuck
GISHOLT #4 Ram Type, 2" Cap., Pres. Head, Bar Feed
JONES & LAMSON #3 Ram Type, Pres. Head, Chucker
JONES & LAMSON #7A Saddle Type, Pres. Head, Chucker
WARNER & SWASEY #3 Ram Type, 1½" Cap., Bar Feed

MILLING MACHINES

MILWAUKEE (K&T) #5H Plain Miller, M.D. in base, 20 HP 220/3/60, Table Wkg. Surface 94"x18", Range 32"x10"x20"

CINN. #2 Dial Type Vertical, P.F. to Head
CINN. Model #1-12, #1-18, and #2-18 Production
GORTON #8D Duplicator, 1944
GORTON #9J Duplicator, 1943
K&T #2B Double Overarm Plain, M.D. in Base, Timken
K&T #2K Vertical Rotary Table, P.F. to Head
K&T #1H Vertical, P.F. to Head
KEMPSMITH #2G Plain
NICHOLS Hand (3)
SUNDSTRAND #00—0" Hydraulic Rigidmill
VAN NORMAN #2SP & #3SP Plain

MISCELLANEOUS

1—BROWN & SHARPE #000 Hi Speed Automatics, 6000 RPM, Serial Nos. 12,000 to 13,320, Exc. Condition

BUFFALO #½ Universal Ironworker (NEW)
FOOTE BURT 1½" Cap., Single Spindle Automatic
FOSTER Hyd. Cyl. Superfinisher
HEALD #40 Single End Borematic (2)
PRATT & WHITNEY #12B 2-Spindle Profiler
SUNDSTRAND Double End Centering Machine

UNITED MACHINERY & TOOL CORPORATION

85 CENTRAL STREET — WORCESTER 8, MASS.

ACT NOW! Maintain production efficiency leadership by keeping your plant well equipped.

(90% of the following machines manufactured since 1941)

AUTOMATICS

Acme-Gridley 2⅝" RA6 Automatic
Cleveland 4" S.S. Model "A"
Cleveland 2½" S.S. Model "A"
Goss & DeLeeuw 6x6¼" 5-Spindle
Goss & DeLeeuw 8" 5-Spindle
Goss & DeLeeuw 2½" 6-Spindle

DRILLS & RADIALS

Allen 6-Spindle Drill Press
Avey S.S. #3 Drill Press
Baker #60 16-Sp. HO Drilling Mach.
Edlund 4 & 6 Sp. Drill Presses
Foote-Burt #2 S.S. Drill Press
Fosdick 6'15" Radial Drill
Fosdick 4'15" Radial Drill
Western 3'13" Radial Drill

MILLS

Brown & Sharpe #2 Vert. Milling Mach.
Cincinnati 1-18 Climb Mill
Cincinnati 2-18 Production Mills
Cincinnati 2-24 Mill
Cincinnati 3-26 Hydromatic Mill
Cincinnati #3 M.B.D.T. Vert. Mill
Cincinnati #3 Plain Horiz. M.B.D.T.
Hardinge Vert. & Horiz. Mills
Kearney & Trecker #2 Plain Mills
Kent-Owens #1M Hand Mill
Lees-Bradner 12x36 Thread Mill
Morey #12-N Vertical Profiler & Millers
Products Model M Hand Mill

Lodge & Shipley 20x54 Engine Lathe

Acme-Gridley 3½" RA-6 Spindle Automatic

Hill-Acme 18 x 60 Surface Grinder

BORING MILLS

Betts 6" Floor Type Horiz. Boring Mill
Bullard 36" Vertical Boring Mill
Bullard 62" Vertical Boring Mill
Cincinnati 44" Vertical Boring Mill
Lucas #31 Horizontal Boring Mill
Niles 100" Vertical Boring Mill
Rogers 36" Vertical Boring Mill

GRINDERS

Arter A1—12" Surface Grinder
Brown & Sharpe #3 & #2 Univ. Grinders
Brown & Sharpe #5 Cylindrical Grinder
Brown & Sharpe #22, 10x36 Cyl. Grinder
Bryant #5 Chucking Grinder
Cincinnati 6x18 Cylindrical Grinder
Cincinnati Monoset Cutter Grinder
Cincinnati #2 Tool & Cutter Grinder
Covel #15 Surface Grinder
Covel #91-A Univ. T & C Grinder
Ex-Cell-O #31 Plain Thread Grinder
Gallmeyer & Livingston Surf. Grinder
Hammond #3 Gr., Buffer & Polisher
Hammond Model #10 D.E. Grinder
Hanchett #36 40" Rotary Surf. Grinder
Heald #22—12" Rotary Surface Grinders
Heald #72 Internal Grinders
Heald #81 Gagematic Internal Grinder
Heald #81 Sizematic Internal Grinders
Jones & Lamson 6"x36" Thread Grinder
Landis 6x30 Type "C" Plain Grinder
Landis 10x18 Grinder
Norton Type "C" 10x36 Plain Cyl. Gr.
Rivette #104 Internal Grinder
Thompson 4C Hyd. 12x48" Surf. Grinder

PRESSES

Bliss #3031/2 S.S. 35 Ton Punch Press
Bliss #56 Punch Press 10 Ton
Ferracute 100 Ton S.S. Punch Press
HPM 150 Ton Hydraulic Press
Jr. Minster #12—24" Press
V & O #3 Inclinable Punch Press

LATHES

American 20"x72" Engine Lathe
American 24"x72" Engine Lathe
Bradford 16x54" Lathe
Fifield 36"x24' Lathe
Gardner #3 Plain Polishing Lathe
Gisholt #3 Turret Lathe
Hendey 14" Engine Lathe
Hendey 14"x6' Engine Lathe
Jones & Lamson #5 Turret Lathe
LeBlond 21x7' Engine Lathe
Lodge & Shipley #3A Duomatic Lathe
Lodge & Shipley 12x36" Engine Lathe
New Haven 84"x24' Lathe
Reed-Prentice 14x54 Lathe 8' Bed
Reed-Prentice 14x30 Lathe 6' Bed
Warner & Swasey #3A Turret Lathe
Wicks 30x16' Bed Engine Lathe
Libby 3R Turret Lathe
LeBlond #4B Gun Boring Lathes

GEAR EQUIPMENT

Gleason 3" Spiral Bevel Gear Generator
Gleason 12" Straight Bevel Gear Gen.

SHAPERS

Fellows #6I Gear Shapers
Gould & Eberhardt 20"x28" Shapers
Pratt & Whitney 6" Vertical Shaper
Rockford 24" Hy-Draulic Shaper
Smith & Mills 16" Shaper Horiz.

MISCELLANEOUS

Fosdick #30-A Jig Borer
LaPointe Model HP-100 Hydraulic Broach, 50 Ton, 76" Stroke
Niles 90° Quartering Machine
Chicago #816 Bending Brake
Do-All V-16 Band Saw
28" Chip Wringer
Airco #10 Pantograph
Williams & White Bulldozer

Write, Wire or Phone VUlcan 3-4200 Today!

Noll EQUIPMENT CO.

7506 BESSEMER AVE
CLEVELAND 4, OHIO

MONA

LATEST TYPE *Nearly New* MACHINES

BORING MILLS—Horizontal
CINCINNATI GILBERT 3½" bar, floor type, latest
DETRICK & HARVEY 4" bar, Floor Type, M.D.
GIDDINGS & LEWIS #23T, 2½" bar, Latest Type
GIDDINGS & LEWIS #45, 4½" bar, Late Type
HEALD 48, 49 single end, Borematic, Latest
LANDIS—#35—3½" bar, floor type, M.D.
LUCAS #41, 3" bar, Table Type, Latest Type
LUCAS #43, 5" bar, Table Type, Late Type
NILES-BEMENT-POND 5" x 6" bar, Floor Type, M.D.
UNIVERSAL 3" bar, high speed, latest type

BORING MILLS—Vertical
BULLARD 16" 6-spindle Mult-Au-Matic Type D, Latest
BULLARD 12" 6-spindle Mult-Au-Matic Type D, Latest
BULLARD 24" 36" Turret "New Era" Side Head, M.D.
BULLARD 24", 36", 42" Vert. Turret "Spiral Drive"
High Speed, Latest Type
COLBURN 72" 2 swivel heads, PRT, M.D.
KING 62" 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, Rapid Traverse, AC M.D.

BROACHES
AMERICAN V-8, 6 ton Hyd., Latest Type
CINCINNATI 1-20, 5-36, Duplex Vertical Surface,
Hyd. Double Ram. Model ER, Latest Type
LaPOINTE 5-36 Vertical, Hyd., Latest Type

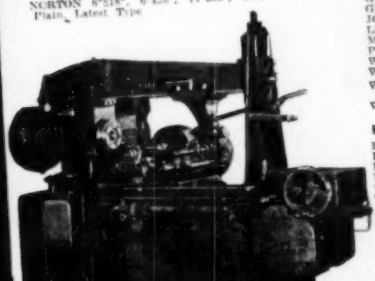
DRILLS—Miscellaneous
BARNES H-3 "Hydram," Hydraulic, 3" capacity—for
inverted drilling, Latest Type
LELAND & GIFFORD 21LMS, 4 Spindle, Latest Type
LELAND & GIFFORD—2, 22MS, Single Spdle.
LELAND & GIFFORD 2"LMS 6 spindle, Latest
LELAND & GIFFORD 2"LMS 6 spindle, Hyd., Latest Type
NATCO #4AL Multiple, 30 spindles, Hyd., Latest Type

DRILLS—Deep Hole
BARNES 420/2 Spindle Hydraulic, Latest Type
LeBLOND #2 Single Spindle, Hydraulic, Latest Type

DRILLS—Radial
AMERICAN 4' arm 11" col. "Hole Wizard." Latest
AMERICAN 4' plain Triple Purpose, Motor Drive
AMERICAN 5' arm 12" column Plain, M.D.
CCINCINNATI BICKFORD 4' arm 13" col., Super-
Service, Latest
CINCINNATI BICKFORD 5'12" Column, Plain, M.D.
CIN. BICKFORD 6' arm 15 col. Plain or Univ., M.D.
DRESES 5' arm 13" column Univ., M.D.
WESTERN 6' arm 20" column Plain, Latest Type

GEAR CUTTING EQUIPMENT
BARBER COLMAN Type A Hobber, Latest Type
BARBER COLMAN #12 Hobber, Single and Double
Overarm, Motor Drive
BILGRAM 6" and 16" cap., Bevel Gear Gen., M.D.
BROWN & SHARPE 6-50 Gear Cutter, Motor Drive
BROWN & SHARPE #13 Spur and Bevel Cutter, M.D.
CROSS #1 Tooth Rounding Machine, Motor Drive
CROSS #50 Universal Gear Chamfer, Latest Type
FELLOWS 61, 61A, 6Z2, Model Z, 7A, 7, 72, 725, 77
High Speed Gear Shaper, Latest Type
FELLOWS #12M Involute Measuring Instrument, latest
FELLOWS #13LS Lapper, Latest type
FELLOWS 8M Red Liner, Latest Type
GLEASON #14 Hypoid Spiral Generator, latest type
GLEASON 3", 12" straight bevel generator, latest type
GLEASON #4, #6, #18 Bevel and Hypoid Tester
GLEASON 24", 27", 96" Straight and Bevel Gear
Planer, Motor drive
GOULD & EBERHARDT 12H Hobber, Latest
GOULD & EBERHARDT 96H Hobber, with diff. M.D
PRATT & WHITNEY 10" Grinder, hyd., latest
SCHUCHARDT & SCHUTTE #1 Hobber, Motor Drive

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
BROWN & SHARPE #3 Plain, 3 x 12, Latest Type
LANDIS 4x12, Type B, Plain Hyd., Latest Type
LANDIS 6"x18" Type C Plain, Hyd., Latest Type
LANDIS 29"x130" Plain Roll, Motor Drive
NORTON 6"x18", 6"x36", 14"x36", 10"x72" Type C,
Plain, Latest Type



BARBER COLMAN Type A Gear Hobber 12" capacity, Latest Type

GRINDERS—Miscellaneous
BARBER COLMAN #2, #4 Hob Sharpener, Latest
BROWN & SHARPE No. 13 Universal Cutter & Tool, Lat.
BRYANT #2, #6, 16-C-16, 16-CP-16, 24-36" Internal,
Hydraulic, Latest Type
CINCINNATI #2, Centerless "Filmatic", Latest
CINCINNATI "Monoset" Tool & Cutter, Latest
CINCINNATI "Monoset" Tool & Cutter, Latest
FITCHBURG 14"x25" Spline, hydraulic, latest
GARDNER 24-52" Disc Grinder, Latest
GLEASON #12 tool sharpener, Latest Type
HEALD 72A5, 72A3 "Gagematic" Internal, Latest
HEALD 72A5, 72A3, 74 Internal, latest
HEALD 72A3, 72A5, Centerless, Sizematic and Gage-
matic, Latest Type
HEALD #81 Internal, Centerless, Sizematic and Gage-
matic, Latest Type
KEARNEY & TRECKER Face Mill Grinder, Latest
KEARNEY & TRECKER 6x15, 6x18 Auto Thread, latest
JONES & LAMSON 6x15, latest type
LANDIS #6, 6x24 Thread, Hydraulic, Latest Type
LANDIS #12 centerless, Hydraulic, Latest Type
LANDIS #12 centerless, Hydraulic Sharpener, Latest
Le POINTE 60" Universal Broach Sharpener, Latest
Le POINTE #6"x48" Auto., round broach, M.D.
THOMPSON 6"x48" Auto., round broach, M.D.
VAN NORMAN #67A, #620, #639, #73 Oscillating
Radius Grinder, Latest Type
VAN NORMAN #666 Crankshaft ReGrinder, Latest

GRINDERS—Surface
ARTOS Model B, 30" mag. chuck, Latest Type
BLANCHARD #11, 16" dia. mag. chuck, Latest Type
BLANCHARD #22, 9"x30" Hyd., Latest Type
DO-ALL Model G-7, 9"x20" Hyd. Feed, Motor Drive
BLANCHARD 16A, Vertical, Plat. Hyd., Latest
BLANCHARD Series 300 12"x48" Vert. Hyd., Latest
HANCHETT Series 300 12"x48" Vert. Hyd., Latest
HANCHETT #36 Vert., 36" dia. mag. chuck, Latest
HANCHETT #36, 30"x120" Plano, Hyd., Horiz. Latest
HANCHETT #120, 30x120" Plano, Hyd., Horiz. Latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD #24—rotary—16" and 36" chuck, Hyd., Latest
HEALD #24A—rotary—16" and 36" chuck, Hyd., Latest
NORTON 6x18 Hydraulic, latest type
THOMPSON 12x12x24 Type D Hyd., Latest Type

JIG BORERS
KEARNEY & TRECKER Model B Autometric, Latest
PRATT & WHITNEY 1A, Motor Drive
SOCIETE GENEVOISE (SIPP) #4 Precision, M.D.

LATHES—Engine and Mfg.
AMERICAN 16"x54" Centers, Geared, Motor Drive
AMERICAN 12"x100" centers, 1 carriage, Motor Drive
AMERICAN 36"x360" centers, 2 carriages, Motor Drive
BRIDGEFORD 36"x32" bed—2 carriages, M.D.
HENDEY 12x30", 14x30" Timken, Latest Type
JONES & LAMSON "Fay" 20x25", 24x24 autom., latest
LeBLOND 21"x66" Centers, Geared, Motor Drive
LEHMANN 16x36" centers, TIMKEN, latest type
LODGE & SHIPLEY 16"x30", 14"x30" Timken, Latest
LODGE & SHIPLEY 18x72 centers, M.D.
LODGE & SHIPLEY 4x84, 8x60, 8x168, 8x34, Latest
LoSWING 4x60, 4x84, 8x60, 8x168, 8x34, Latest
MONARCH 10"x20" centers, Model EE, Timken, latest
MONARCH 10"x20" Centers, Model CKK, Timken, lat
MONARCH 12"x30" Centers, Model CK, Timken, latest
MONARCH 13"x54" Centers, Model CW, Latest
MONARCH 16"x76" Centers, Model CW, Latest
MONARCH 24"x54" Ball Bearing, Geared Head, M.D.
MONARCH 22"x144" Centers, 3 Carriages, Timken
Bearing, Model CM, Motor Drive
NILES 50"x50' Boring "Time Saver" Timken, Latest
NILES 50"x50" Boring "Time Saver" Timken, Latest
PRATT & WHITNEY 16"x30" Centers, Timken, Latest
PRATT & WHITNEY 16"x30" centers, Bench, latest
PRATT & WHITNEY 1440 Motor Drive
PUTNAM 12"x24" Centers, Model A, Latest
REED PRENTICE 20"x54" Centers, Toolroom, Latest
SOUTH BEND 14½"x60" Centers, Timken, latest type
SPRINGFIELD 16"x30" Centers—18/30x60" centers gap,
WARD, HAGGAS & SMITH—18/30x60" centers gap,
motor drive, Latest Type

LATHES—Hob and Cutter Relieving
CLEVELAND 12"x16" Centers, Cutter, Motor Drive
MICHIGAN 1210 Universal, Latest Type
T. & T. TOOL #810B, 8"x15" Centers, Cutter, Latest
Type

LATHES—Turret
BARDONS & OLIVER #5, #7, TIMKEN, Latest Type
CINCINNATI ACME No. 5, Timken, Latest
FOSTER 21FC "Pastomatic," Timken, Latest
GISHOLT 21FC "Pastomatic," Timken, Latest
GISHOLT #1L, #2L, #3L Universal, Timken, Latest
GISHOLT #3, 24 Univ., Timken, Latest Type
GISHOLT #3, 24 Univ., Timken, Latest
JONES & LAMSON #2, #5 Univ., Timken, Latest
LIBBY "International" 1H5 Univ., Timken, Latest
MOREY No. 2, No. 3, No. 4, Timken Bearing, latest
POTTER & JOHNSTON 2-52E, Timken, Latest
POTTER & JOHNSTON 2-52UE, Universal, Timken Bearing
WARNER & SWASEY #2, #3, Timken, Latest type
WARNER & SWASEY #2, #3, Timken, Latest Type Bear-
WARNER & SWASEY 2A Universal, Timken Bear-
WARNER & SWASEY 2A Universal, Timken Bearing,
type "Pre-selector" Bar and Chucktor, Latest Type
WARNER & SWASEY 5A Universal, Timken Bearing,
Bar and Chucktor, Latest Type

MILLING MACHINES—Mfg.
HALL Style L, Planetary, latest type
INGERSOLL 42"x42"x12" adj. rail, 4 heads, AC, M.D.
INGERSOLL 42"x84"x12" adj. rail slab, M.D.
INGERSOLL 52x24x16' Planer Type, 2 heads, AC, M.D.
INGERSOLL 52x24x12' adj. rail slab, M.D.
INGERSOLL 30x21x12' adj. rail slab, M.D.
SUNDSTRAND Model 5A Duplex 42" feed, Latest
TAYLOR & FENN Mod Duplex Spline, latest

MILLING MACHINES—Plain
BROWN & SHARPE #2, Light Type, Timken, Latest
BROWN & SHARPE #12, 24" feed, Latest
BROWN & SHARPE #00B, Timken, Latest Type
BROWN & SHARPE #2B, 3B, Timken, Latest Type
CINCINNATI 0-18, 2-18 Automatic, Latest Type
CINCINNATI #2, #4, #5 High Power, Late Type
CINCINNATI 4-36 Hydromatic, Simplex, Latest Type
CINCINNATI 4-36 Hydromatic, Simplex, Latest
KEARNEY & TRECKER 12B, 3H, 4H, 5H, Latest
KEARNEY & TRECKER 1218, 1404, Simplex, Latest
KEARNEY & TRECKER 2B, #4, Timken, Latest Type
KEARNEY & TRECKER 4K, Timken Bearing, Late
KEARNEY & TRECKER 4K, Timken Bearing, Late

MILLING MACHINES—Thread
LEESE BRADNER Model 1T, 6"x20" Centers, Latest
LEESE BRADNER Model 3T, 12"x54" Centers, Latest
MOREY 12x30", 60", 120", 190" centers, Latest Type

MILLING MACHINES—Universal
BROWN & SHARPE No. 2A, Timken Bearing, Latest
BROWN & SHARPE No. 3A, 4A, Motor Drive
BROWN & SHARPE #22MH, Timken, Latest Type
CINCINNATI #22MH, Timken, Latest Type
KEARNEY & TRECKER 2H, Timken, latest type
KEMPSMITH #4 Maxi-miller, Timken, latest type
KEMPSMITH #4 Duplex, Motor Drive
VAN NORMAN #26, #36, Timken, Latest Type
VAN NORMAN #26, #36, Timken, Latest Type

MILLING MACHINES—Vertical
BROWN & SHARPE #2 Standard Timken, Latest
CINCINNATI #4, Dial Type, High Speed, Latest
CINCINNATI #2, Dial Type, Timken, Latest
CINCINNATI #9K, TIMKEN, Latest Type
CINCINNATI #9 Hi-Speed Super-Speed, Latest Type
GORTON 8D, 8AD Super-Speed, Latest Type
KEARNEY & TRECKER 2H, 2K, 3H, Timken, Latest
KEARNEY & TRECKER 2VG, with or without hydraulic
MOREY 12M Single & Double Spindle Profiler, Latest
REED PRENTICE 2VG, with or without hydraulic
duplicator, Timken bearing, Latest Type

PLANERS
BETTS (CONSOLIDATED) 84"x92"x16' 4 heads, Box
Table, Rapid Traverse, D.C., M.D., Late Type
BETTS (CONSOLIDATED) 108"x84"x30' 4 heads, Box
Table, Rapid Traverse, D.C., M.D., Late Type
CINCINNATI 96"x30"x8' 4 heads, PRT, DC, M.D.
DETRICK & HARVEY 48"x18"x16' 4 heads, Hydraulic,
Rapid Traverse, A.C. Motor Drive
NILES 108"x84"x32' 4 heads, Box Table, Rapid Tra-
verse, D.C., M.D., Late Type
NILES 42"x12"x14' "Time Saver," Box Table, 3 Heads,
PRT, VARI-VOLTAGE Drive, Latest
NILES 96"x96"x24' 4 heads, Rapid Traverse, Box
Table, D.C. reversing motor drive

WATCH THIS PAGE!
For MODERN high quality machine tools nearly all built new since 1941. These tools are priced well within your equipment budget. *Wire, write or phone for pictures, details and prices, today.*

PRESSES
BIRDSBORO 325 ton, vert. hyd., Latest Type
BLISS 75-25 Hydro-Dynamic, Double Action, Latest
GLEASON 15" Quenching, Hyd., Motor Drive
HENRY & WRIGHT 50 ton Dieing, Roll Feeds, M.D.
LAKE ERIE 500 ton Vert. Hyd., Latest Type
NILES 400 ton, Horiz. wheel, Motor Drive

SCREW MACHINES—Automatic
ACME GRIDLEY 2" Model RAS, 6 spindle, Latest
BROWN & SHARPE 2G, 1" capacity, M.D.
CLEVELAND 9/16", Model A, Latest Type
CONOMATIC 1⅝", 8 spindle, High Speed, Latest
CONOMATIC 2⅝"—6 spindle, high speed, Latest Type
GOSS & DeLEEUW 6"x6¾", 5 spindle Chucker, Tool
rotating, Latest Type
GOSS & DeLEEUW 8", 5 spindle Chucker, Work Ro-
tating, Latest Type

SHAPERS & SLOTTERS
AMERICAN 26" Heavy Duty, Motor Drive
DILL 20", 24" Vertical, Motor Drive
GOULD & EBERHARDT 20", 32", High Duty, M.D.
PRATT & WHITNEY 6" Vertical, M.D.
ROCKFORD 26", Hydraulic Shaper-Planer, Latest

SHEARS—Power
WYSONG & MILES #372, 14 gauge x 6' Latest Type
QUICKWORK #7, 5/8" Cap., Rotary Shear, M.D.
QUICKWORK #6, 1" Cap., Rotary Shear, M.D.

MISCELLANEOUS
AJAX 2", 3½" Forging and Upsetting, M.D.
BAKER #3, Reseseter Motor Drive
BARNES #172, 306H, 307, 307H Vertical Hone, Hyd
Self-Oiling, Latest Type
CAMPBELL #401 Abrasive Saw, Latest Type
DE LAVAL #1HC Coolant Clarifier, Latest
FOSTER 4"x18", 4"x36" Superfinisher, Latest
HELLER Model 8S-1 Cold Saw, 6" cap., M.D.
LANDIS 2" Single Spdle Bolt Threader, M.D.
MANVILLE 2H 1/16" Cap. 8SSD, Ball Header, M.D.
NAZEL #4B Pneumatic Hammer, M.D.
NORTON #2F 10U Vertical Lapper, Latest Type
PRATT & WHITNEY (KELLER) Type BL 2416
Type G, Copying 2 and 3 dimensional, Latest Type
ROWBOTTOM Cam Miller, Motor Drive
WATERBURY FARREL #2B Thread Roller, M.D.

Most Built After 1941

Available for Prompt Shipment
(Partial List) Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

MOREY MACHINERY CO., INC.
FOR MORE VALUE...

BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-5360
ADDRESS: WOODWORK, N. Y

UNUSUAL BUYS WITH GUARANTEED PERFORMANCE

BORING MILLS

Bullard 24" Vert., Spiral Drive
Bullard 30", Vert., New Era Type Head
Lucas 9" bar, #1, Horiz.
Heald #49, Single End Barometric
Heald #47 A, Boring Machine
P & H Horiz. 4" bar
Defiance #28 A Boring—Drilling, 3½" bar
Defiance #6, 4½" bar
Niles 30", Vert., M.D.
King 52", Vert., M.D.

BULLARD 42" LATE TYPE

LATHES

American 14"x5', 5 spd. SCEL
American 16"x72" Paramaker, 27 speeds, MD
American 16"x5', 4 spd. hg. SCEL
American 16"x6', Cullman Drive
American 16"x8', 8 spd. dbg. SCEL
American 16"x6', Geared Head
American 18"x8', 3 spd. Bowl Head, BG
American 24"x10', SPD, GH, SCEL
American 24"x12', 8 speed, GH, SCEL
American 24"x12', 12 Speed, M.D.
American 24"x14', 8 speed, GH

AMERICAN 30"x15" GH, 12 SPEED SCEL, M.D.
AMERICAN 30"x20' GH, 12 SPEED, SCEL, M.D.
AMERICAN 42"x14' BED INTERNAL FACE PLATE DRIVE GH ENGINE LATHE, M.D.

Boye & Emmes 10"x8', 4 spd. dbg. SCEL
Boye & Emmes 10"x8', 3 spd. dbg. SCEL
Boye & Emmes 10"x8', 3 spd. Lima Drive
Boye & Emmes 10"x10', M.D., SCEL
Hendy 14"x6', 3 spd. sc. SCEL
Hendy 14"x6', 4 spd. Drive all Drive
Hendy 14"x6', Model EBM, Motor driven
Hendy 16"x6', 4 spd. dbg. SCEL
Hendy 18"x8', 4 spd. SCEL
LeBlond 17"x8', spd. 12 speeds, gh
LeBlond 17"x8', 3 spd. dbg
LeBlond 21"x8', 3 spd. dbg. SCEL
LeBlond 24"x10', 3 spd. SCEL

LEBLOND 25"x12' H.D., QC, SCEL, M.D.

LODGE & SHIPLEY 14"x30" CENTERS, SELECTIVE G.H., M.D.

Lodge & Shipley 14"x5', 5 spd. hg. SCEL
Lodge & Shipley 14"x6', 3 spd. dbg. SCEL
Lodge & Shipley 16"x8', Selective G.H.
Lodge & Shipley 18"x8', spd. SCEL
Lodge & Shipley 18"x8', 3 spd. dbg. SCEL
Lodge & Shipley 16"x9', 3 spd. dbg. SCEL

LODGE & SHIPLEY 20"x5' GH, SCEL, M.D.

Lodge & Shipley 20"x10', 5 spd. SCEL
Lodge & Shipley 24"x10', 3 spd. dbg. Turner Uni Drive
Monarch 14"x6', 3 spd. dbg
Monarch 16"x8', 8 speeds, SCEL

NILES TIMESAVER 20"x10' CENTERS DOUBLE WALL APRON

Sebastian 16"x8', 4 spd. SCEL
Sebastian 20"x8', GH, SCEL
Schumacher & Boye 36"x24', Internal Face Plate Drive
Springfield 18"x8', 4 spd. SCEL

GEAR CUTTERS

Brown & Sharpe #3—10" Automatic, SPD
Gould & Eberhardt 18H, spd. MD
Gould & Eberhardt 36S, Vert. cutter
Brown & Sharpe #7—28", MD
Fellows #61S, Helical
Gleason 6" straight Bevel, MD
Gleason 19" Spiral bevel gear Generator

GRINDERS, ALL TYPES

Cincinnati #2 Centerless
Cincinnati #3 Centerless
Brown & Sharpe #13 Univ. & Tool Grinder
Covel #91A Univ. Cutter & Tool Grinder
Gardner #120A Opposed Wheel Grinding Machine
Sellers #4T Tool Grinder
Landis 12"x72" Plain Self Contained Grinder
Norton 14"x96" Type BA Plain Grinder
Landis 20"x220" centers, Plain Cylindrical Grinder
Landis 10"x72", Plain Self Contained
Brown & Sharpe #2 Plain Grinder
Norton 14"x96" Univ. Grinder
Landis 10"x24" Type "C" Hvd. Univ. Grinder

GRINDERS

CINCINNATI 14"x30", Hydraulic Grinder
Gallmeyer & Livingston #4, Univ. Tool Grinder

TURRET LATHES

WARNER & SWASEY #5, WITH PRESELECTOR

Warner & Swasey #2, Ram type

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

Botwinik has BUYS! BUYS! $ $ $ $ $ *and more* BUYS!

LATHES

Lodge & Shipley 24"x12', 12 spd. sel. gr. hd. 27½" swing, 76" C.D.
Lodge & Shipley 30"x16', 12 spd. sel. gr. hd., 34½" swing, 110 C.D.
Putnam 36"x20' H.D. triple bk. gr. 37" swing 12'7" C.D., M.D.
Leblond 33"-60" sliding gap lathe, 9'2" C.D. Gap Closed, 14'2" C.D. gap extended.
Jones & Lamson #5, 2½" cap. ram type Universal, bar and chucking.
Gisholt #5, 2½" cap. ram type Universal, Preselector head, thread attachment, bar and chucking, tooling.
Warner & Swasey #2A, 2½" cap., #3A, 4½" cap., saddle type, universal, rpd. trav. full length lead screw, bar and chucking.

BORING MILLS

Universal 4" bar "Tri-Way", face plate to outer support 72", #6 taper, added vertical range (late).
Defiance 25A, 3¾" bar, face plate to outer support 102", #6 taper, added vertical and cross range (late).
Lucas #41, 3" bar, face to outer support 72", #5 taper, (late).
Fisher 5" floor type vert. travel hd. 60", hor. travel col. 110", platen (very late).
Bullard 24" and 36", "spiral drive" 24", 36" and 42" "New Era" type vertical, 3-jaw and 4-jaw chuck tables.

PLAIN MILLERS

Brown & Sharpe #2 lite type, wkg. tbl. 50½"x 10", range 28"x10"x15', rpd. trav. (late).
Milwaukee #5H med. spd. wkg. tbl. 24"x18", range 52"x16"x20", rpd. trav. (very late).
Ingersoll 48"x48"x16' D.H. Planer type Milling Machine wkg. tbl. 42"x18", one head on cross rail, 2 side heads, A.C. M.D.
Kempsmith #4 Plain—motor-in-base Maximiller, wkg. tbl. 13½"x64½"—range: 42"x 14"x20" (late).

PLAIN, INTERNAL & UNIVERSAL GRINDERS

Cinn. 14"x72", hyd. universal, film brg. (very late).
Farrel #30"x182" M.D. roll grinder, max. face ground 182" min. dia. ground 9".
Cinn. #2 and 3" centerless, film. brg., long bar and auto. infeed attachment (late).

A Complete List of Our Huge Stock Will Be Forwarded on Request.

Botwinik Brothers
of Mass. Inc.
3 SHERMAN ST WORCESTER 1 MASS

No. 25T G. & L., 2½" table Hor. Mill, 1942
4" Univ. Table Mill, 60" vert. 96" hor., '43
36" & 42" King Side Hd. Vert. Mills, '43
Nos. 1A & 3 W. & S. Turrets, bar & chuck
Nos. 3 & 2MH Cinci. Pl. Dial Millers, late
Nos. 3K & 3H K. & T. Pl. Dial Millers, late
No. 36 Van Norman Pl. Miller, rams, '43
No. 2G Kempsmith Univ. Miller, 1943 (3)
No. 2416 Keller Duplicators, late
No. 9J Gorton Duplicator & Vert. Miller (2)
12"x24" G. & L. No. 45 Surface Grinder, '42
No. 70A Heald Internal Grinder, 1942
Gear Cutter, No. 13 B. & S., spur & bevel
30"x20' con. Axelson Lathe, T.A.
30"x120" Hanchett Plano Surface Grinder
3" Univ. Table Mill, 40" vert., 72" hor., '43
36" Bullard Spiral, 3 motor Hi-speed
No. 2 Stand. K. & T. Univ. Miller, Timken
Gear Gen., No. 81A Fellows, 1943
Gear Cutter, 3-36" B. & S. Spur, Late
12"x48" Hanchett Vert. Spin. Surface Grinder
96"x96"x24' N.B.P. Planer
6' 17" col. Carlton Radial, M on arm
No. 254 Chicago Press Brake, 60" x 10 ga.

BENNETT MACHINERY CO.

30 Church St., New York 7, N. Y.

CRANE—Milwaukee 30 Ton 95' Span with 10 Ton Aux. Hoist. MILL TYPE. NEVER USED.

ROLLS—Bending, 30'x¾", Pyramid Bending, 15'x3" Vertical, Pyramid Bending, 11'x¾" Initial
TURRET LATHE—#3L Gisholt (1942)
PLATE EDGE PLANER—32'x2"
PLANER—N.B.P., 48"x48"x26', 4 Heads
MILLER—K. & T., #4K, Plain Horiz. (Late)
SHEARS—7'x1", 8'x1½"
PRESSES—Z & H #7 50 ton, Percussion Bliss #6, 125 ton, (late) Clearing, 200 ton, (late) Bliss #310, 450 ton

KINGS COUNTY MACHINERY EXCHANGE

408 Atlantic Ave., Brooklyn 17, N. Y.
Dept. "A" Phone TRiangle 5-5237

1—CINCINNATI #2 Tool and Cutter Grinder, complete with all attachments, arranged for 220 volts, 3 phase, 60 cycles. 1943.

1—#5 BROWN & SHARPE Plain Grinder 3"x18" with rapid return on head.

1—18"x8' Geared Head AMERICAN Engine Lathe, serial #56530, chucks, collets, taper attachment.

FERDINAND J. SNOW CO.

381 Broadway Westwood, N. J.
WEstwood 5-3271-2

AARON FOR ONE OF THE LARGEST STOCKS OF MODERN MACHINERY AT LOWEST PRICES—MONEY BACK GUARANTEES

AUTOMATICS
Brown & Sharpe, Nos. 00G, 4 and 6.
Conomatic 8 sp. 1⅞" cap.
CECO ⅜"
Fay Automatic, 12"x81".
New Britain No. 61—2¼" 6 spd.

BORING MILLS
Giddings & Lewis No. 0, No. 25T.
Lucas No. 31, horiz., Heald single & dble. spd.
Universal 3" horiz. equipped.

DRILLS AND RADIALS
Allen, 6 spindle
Cincl-Bickford Sup. Ser. 21".
Carlton 8' 19" col., Canedy-Otto 3' 9" col.
Sibley 24"-28"
Hamilton, Langelier, Hi-Speed.

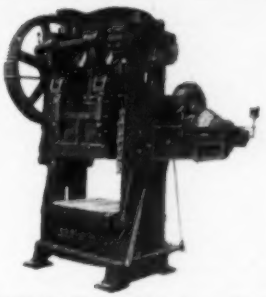
ENGRAVERS
Gorton No. 3U, Deckel G1, 2 dimen.
Gorton No. 3L, Deckel GK1, 2 dimen.
Gorton Cutter Grinders 275-2, 265-4.

GEAR EQUIPMENT
Barber Colman No. 3 Precision & Pl.
Fellows 72, 725, 645Y, High Speed.
Gleason #2 Surface Hardener.
Michigan, Gleason, Fellows Checkers.
Mikron Gear Hobber.

GRINDERS, MISCELLANEOUS
Brown & Sharpe No. 5 cyl. 2" x 18".
B. & S. Nos. 1, 2, 3 Univ.
B. & S. No. 13 Univ. & Tool.
Cinc. No. 2 Centerless Filmatic.
Cinn. 12 x 36", 12 x 48" Filmatic Univ.
Covel No. 91A Univ. Tool & Cutter.
Gardner #226, 20" Disc.
Heald 72A3 Sixematic Int. Centerless.
K.O. Lee Tool & Cutter.
Landis Centerless.
Landis No. 4H Cyl. 4x 12", No. 6 Thread.
Norton No. 2 Tool & Cutter, Hyd.
Oliver 510 Drill Grinder, Sellers 4G Drill Grinder

GRINDERS, SURFACE
Abrasive No. 33, 34 Vert., 8 x 24
Blanchard No. 11, 16" Mag. Chuck.
Brown & Sharpe No. 5, 8x24" Hydr.
G. & L. No. 25, 35 Hyd., 6 x 18", 8 x 24".
Hanchett Model 200, 13 x 48".
Norton 6 x 18", Hyd.
Reid No. 2A P.F. MIB.
Reid No. 2C Pope Spdl. Hand Feed.
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18".

LATHES
Bradford 14"x6', Sebastion 12"x4' G.H.
Hardinge Precision, 1" Collet Cap., Rivett.
Hendey G.H. 16x30", Rel. Att.
LeBlond Regal 10"x31½', 15"x30", 16"x40" TA, 19"x48" TA, 21"x 60"
LeBlond Heavy duty 16"x30".



Bliss Double Crank Toggle Press No. 406

Bliss No. 306 Straight Side geared Press. 8" stroke, 26" x 24" bed.

HYDRAULIC PRESSES

DOWN MOVING RAM, SELF CONTAINED

MANUFACTURER	TON CAP.	STR.	OPENING	PLATEN
Lake Erie	500	36"	68½	35 x 36
Baldwin Southwark	600	32"	36"	76 x 59
H.P.M. Double Action	500	24"	30"	36 x 36
Watson Stillman Shaft Straightener	500	24"	57"	24" bed.
Denison	25/50	18"	23"	22 x 20
Hamilin	50	20"	30"	22 x 30
Southwork, D. A. Clamping Plate	150	30"	2' to 4'	84 x 30
Oliqear Shaft Straightener	35	8"	12"	84 x 11

DOWN MOVING RAM, WITHOUT POWER UNIT

Mesta	750	42"	80"	44 x 44
Chambersburg	300	10"	27"	22 x 36
Southwork	350	42"	78"	28 x 48
Southwork	850	23"	68½"	42 x 32

UP MOVING RAM PRESSES

Waterbury Farrel	1000	7"	55½"	30 x 28
Waterbury Farrel	800	6½"	28"	22 x 24
Waterbury Farrel (3 Rod)	500	6"	28¾"	28" Bet. Rods
Watson Stillman	300	12"	21"	24 x 20
Watson Stillman	300	12"	19"	20 x 20
Watson Stillman (Hob) New and Used	300	6"	22"	16 x 16
HPM	180	15"	14½"	30 x 30
Dunning & Boschert Molding Press	300	12"	38"	24 x 32 Mold
Stokes Molding Press and Pump	100	7"	24"	22 x 15
Stokes Molding Press and Pump	150	8"	31"	24 x 23
Elmes—With Elec. Plates	50	4"	12"	18 x 18
Stewart Boling	85	10"	19"	20 x 20

WHEEL PRESSES

NILES—400 ton 96"; 500 ton—48"; 300 ton—48".

INJECTION MOLDERS

ACCUMULATORS

Mfr.	Size	Pounds
HPM	6" x 9"	2000
General Electric	15" x 11"	400
Watson Stillman (12 gal) Hydr. Pres.	42 x 9 x 48"	3000

Lodge & Shipley 16 x 78" T.A., Collets, etc.
Monarch 10"x 20" EE, 16 x 78 G.H., 12 x 30"
South Bend Q.C.G., 13" x 6', 10" x 4', 14" x 6'

MILLS, PRODUCTION
Brown & Sharpe, No. 000, 12, 21.
Cincinnati No. 1-12, 1-18, 2-18 Mfg.
U. S. Multimiller, 1 and 2 Spindles.
Sundstrand 60 Rigidmills, Nichols, Kent Owens 1V.

MILLS, PLAIN AND UNIVERSAL
B. & S. No. 2H Plain
B. & S. No. 2A Univ.
Cincinnati No. 3 Plain
Cincinnati No. 2MH Univ.
Milwaukee 2HL, 2H Univ.
Milwaukee No. 2H Plain.
Van Norman Duplex, 12, 20, 22L, 36.

MILLS, VERTICAL
Bridgeport, Index, Jackson
Brown & Sharpe No. 2 Standard.
Cincinnati No. 4, Hi-Power.
Gorton No. 8D, 9J Plain, 8½D Duplicator.
Kearney & Trecker, 3H.
Moore Jig Grinder.
Morey No. 12M Profiler 2 sp.
Sipp MP5 Jig Borer.

PRESSES
Bliss No. 30A, 4" Str. 23"x24" bed.
Bliss No. 305A, 4" Str. 30" x 30" bed.
Bliss No. 645B, 650, 675 Hi-Production, 58, 62, 62A, 162.
Bliss No. 8 42"x96".
Bliss No. 4½ Double Action Cam Press.
Henry & Wright Dieing, 25 Ton, 75 Ton.
L & J #22, 3, 4, O.B.I.
Reliance 45 Ton, O.B.I.
Gen. Screw Press.
Z. & H. 30 Ton, O.B.I.
Stokes Tablet Presses, Model R & T.

TURRET LATHES
Acme No. 4W, 6W Bar and Chuck, Acme Fox.
Bardons & Oliver No. 3, 1⅛" cap., No. 5, Chuck.
Brown & Sharpe No. 1, 2F, Foster No. 3B.
Gisholt No. 4, 5 Bar and Chuck, Ilo.
J. & L. No. 8A, Well Tooled, Excellent, Saddle type.
Warner & Swasey No. 3, 4, 5, Preselector, No. 4A 8" Cap.

MISCELLANEOUS
Hand Saw; Doall Contour and ML.
Tannewitz No. 36M.
Bending Roll; Buffalo No. 0, Excelsior 14, Buffalo Wrapping Roll No. ⅛.
Broach, American Horiz. Hyd. H-15-60.
Comparator: Jones & Lamson BC8.
Hacksaw: Marvel Nos. 4B, 6 and 6A Automatic Feed.
Notching Press: Ferracute C82.
Pin Machine: Nilson.
Shaper: Gould & Eberhardt, 32" Univ., Vernon 12" Brand New
Shaper—P&W 6" Vertical.
Honer: Micromatic Hydrohoner, Sunnen.
Keyseaters: Mitts & Merrill, Baker, Burr.
Rivet Hammers: Hi Speed, Chic. Pneumatic.
Toolmakers Microscope: Gaertner, B & L.
Router: Onsrud W240, #55 Oliver.
Tapper: Bakewell #1, Haskins 3C, 2C.
Welders—Spot & Seam: Thompson, Taylor, Winfield.

WRITE FOR FREE CATALOG

AARON MACHINERY CO., Inc.

45 Crosby Street, New York 12, N. Y.
WOrth 4-8233, Cable: AARMACH, N. Y.

MONA MEMBER

LATE TYPE MACHINE TOOLS

AUTOMATICS
6" RPA-8 Acme-Gridley Chucker. 1941.
16" Bullard Mult-Au-Matic. 6 spdl. 1941.
2⅝" RA-8 Acme-Gridley. 1943.
1⅝" Greenlee, 6 spindle. 1942
9/16" RA-6 Acme-Gridley. 1942.

BORING MACHINES
No. 42 Lucas Horizontal. 1940.
No. 54 Excello Double End. 1940.
No. 46B Heald Single End. 1940.

DRILLS
5' 15" Cincinnati-Bickford. 1942.
3' 9" Morris "Mor-Speed". Latest.
25" Fosdick "Economax". 1941.
No. 217 Baker, box column. 1942.
No. 5 BM Fosdick, box column. 1942.

GEAR EQUIPMENT
3" Gleason Generator. 1941.
No. 6 & 17 Gleason Testers. 1943.
12" Red Ring Internal Shaver. Late.
No. GCL Red Ring Shaver. 1942.
No. 624A3 Fellows Side Trimmer. New.
No. 645A3, 615A & 61A Fellows. 1944.
No. 7125A & 712 Fellows Shaper. 1943.
Vinco Spline & Gear Grinder. 1942.

GRINDERS, CYLINDRICAL
25"x48" Landis, Crankshaft. Like New.
16"x36" Cincinnati Plain. 1942.
12"x48" Cincinnati Univ. 1943.
10"x72" Landis Plain. 1942.
10"x18" Norton Plain. 1942.

GRINDERS, INTERNAL
No. 74 Heald Ext. Bridge. 1941.
No. 72A3 & A5 Heald Plain. 1944.
No. 5 & 16A22 Bryant. Latest.

GRINDERS, SURFACE
12"x16"x60" Thompson Hyd. Latest.
No. 22 & 25A Heald Rotary. 1943.

LATHES, ENGINE
45"x192" Axelson. 1942.
28"x276" Bertram. 1942.
24"x168" Sidney. 1942.
18"x54" Lodge & Shipley. 1943.
18"x48" Bradford. 1942.

LATHES, PRODUCTION
Gisholt "Simplimatic". 1940.
No. 3A L&S "Duomatic". 1943.
No. 2FU Foster "Fastermatic". 1943.
8"x108" Lo-Swing Semi. Auto. 1942.
Model 8, 10 & 12 Sundstrand. 1942.
14"x42" Monarch "Magna-Matic". 1941.

LATHES, TURRET
42"x36" Bullard Vertical. 1943.
No. 1A, 2A & 3A Warner & Swasey. 1943.
No. 1 & 8½"x24" Acme Univ. 1943.
No. 2, 3 & 4 Warner & Swasey. 1943.
No. 3, 5 & 7 Bardons & Oliver. 1942.

MILLS, PLAIN
No. 5 Cincinnati. 1943.
No. 4 Cincinnati Dial Type. 1942.
No. 4H & 4K Milwaukee. 1943.
No. 3 Van Norman. 1942.
No. 2HL Milwaukee. 1942.

MILLS, PRODUCTION
No. 1-14 & 2-20 Kent Owens. 1942.
M-18 Kearney & Trecker. 1943.
No. 1224 Kearney & Trecker. 1942.
No. 3-36 Cincinnati Duplex, R & F. 1942.
No. 1-18, 2-18 & 2-24 Cincinnati. 1942.

MILLS, THREAD
6"x60" Pratt & Whitney. Latest.
12"x54" Lees Bradner. 1943.
4"x9" Hanson Whitney. Late.

MILLS, UNIVERSAL
No. 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 2SU & 26SU Van Norman. 1942.

MILLS, VERTICAL
No. 3B P&W Univ. Die Sinker. 1943.
No. 2K & 3H Milwaukee. 1942.
No. 2 & 3 Cincinnati. 1942.
No. 1 Cleveland. 1942.

PRESSES
No. 40—5½ Minster. 1942.
100 Ton Hannifin, Hyd. Str. 1942.
90 Ton Denison, Hyd. Str. 1942.

INDIANAPOLIS MACHINERY & SUPPLY CO.
1961 S. Meridian St.
INDIANAPOLIS 6, IND.

CHECK THIS LIST OF FINE TOOLS

AUTOMATICS
½", No. 0G Brown & Sharpe
9/16" Acme Gridley model R6
⅞" & 1¼" Cone 4 spindle
1¼" Cleveland 4 spindle
1½" Greenlee 6 spindle
1½" New Britain 6 spindle
1⅞" Conomatic 8 spindle
2"x18" Cleveland model B
2½" Acme Gridley model RA6
8" Bullard Multaumatic
No. 2 FU Foster Fastermatic
No. 18 New Britain 6 spdl. chucker
14"x18" Fay chucker
No. 3DE2 Potter & Johnston

BROACHES
10 ton 36" stroke Colonial duplex surface
15 ton 36" stroke American duplex surf.
No. 1 Foote Burt duplex surface
2 ton American horiz. hydraulic
No. 3 Oilgear horiz. hydraulic
No. 10-72 Colonial horiz. hydraulic
No. 3 Lapointe screw type
10"x72" Colonial broach sharpener

DRILLS, MULTIPLE
42 spdl. No. B 16 Natco
34 spdl. No. 30 Natco
24 spdl. No. B4A Natco
22 spdl. No. 14 Natco
16 spdl. No. 2 BL Natco
12 spdl. No. 39 Natco rail
12 spdl. No. 25 Baush rail
8 spdl. No. 11 Natco

GRINDERS
No. 72A3 Heald Sizematic internal
No. 72A3 Heald Sizematic centerless
Nos. 72A3, 72A5 & 74 Heald plain
No. 75A Heald hand feed
Nos. 16A18, 16-28, 16-36, 16CP18 & 24-36 Bryant
Model MHI Saw-way hydraulic
Size 1C Greaby internal
No. 2 Cincinnati centerless
No. 10 Blanchard surface
Nos. 3 & 34 Abrasive surface
6"x24" Wilmarth Mormon surf.
12" & 18", No. 22 Heald rotary surf.
16" & 24" No. 25A Heald rotary surf.
No. 2 Norton universal tool
Model 4T Sellers tool
No. H8 Pratt & Whitney tool
No. 31 & 510 Oliver drill
No. 10G Sellers drill
Nos. 33 & 35 Excello thread

LATHES, TURRET
Model 6.2 Denver
Nos. 2 & 3 G Morey
No. 4 Midland
Nos. 5 & 7 Bardons & Oliver
No. 3 Jones & Lamson
No. 5 Foster
Nos. 2, 3, 4, 1A & 3A Warner Swasey
Nos. 3, 4, 5, 3AL & 28" Gisholt
24" & 36" Bullard vertical
No. 2 FU Foster Fastermatic
3"x36" & 4"x34" Jones & Lamson

MILLERS
No. 2H Kearney & Trecker univ.
No. 3 Cincinnati universal
Nos. 2AS & 3B Milwaukee plain
Nos. 2, 3 & 4 Cincinnati vertical
Nos. 2H & 3H Kearney Trecker vert.
No. 2V Van Norman vertical
No. 3 Kempsmith Maximill vert.
Nos. 1-12, 1-18, 2-18 & 2-24 Cint. auto
Nos. 0-8 & 2-18 Cint. Rise & Fall
Nos. 3-24, 34-36, 4-36, 4-48, 5-48, 58-72 and 58-90 Cincinnati Hydromatic
Nos. 1H-12", M18, M24 & 12-24 Kearney & Trecker
30", 42" & 84" Ingersoll Rotary
Nos. 4, 6, CT38 & 40 Lees Bradner thread

PRESSES
1000 ton Southwark hydraulic
1000 ton No. 666 Toledo coining
600 ton No. 2318½ Hamilton forging
350 ton No. F1350-42 clearing
48", No. 93½ Toledo double crank

MILES MACHINERY CO.
SAGINAW, MICH.

EXCEPTIONAL TOOLS

No. 2D KEARNEY & TRECKER Rotary Head Miller

No. 22VS REED PRENTICE Vertical Miller & Die Sinker

No. 12 FELLOWS Gear Shaver

Nos. 2HS and 3HS CINCINNATI High Speed Vertical Millers

No. 28/120 CINCINNATI Vertical Hydrotel, single spindle, hand controls

12"x48" CINCINNATI Universal Grinder

WIGGLESWORTH MACHINERY COMPANY
203 Bent St. Cambridge, Mass.

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
SUBJECT TO PRIOR SALE — GUARANTEED

MINI

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

this Searchlight Section of

AMERICAN MACHINIST

is an index of reliable sources for Used and Surplus Equipment Supplies now available. Consult the *Searchlight Section* in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, use the Searchlight Section of American Machinist to help you locate buyers. . . . Send a list of your equipment and we will gladly give information as to space and rates.

Classified Advertising Division

AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

HILL-CLARKE MACHINERY COMPANY

ESTABLISHED 1867 · H. W. MONS, President · W. L. DITFURTH, Vice-President · T. H. PRICE, Secretary

AUTOMATICS
1⅝" Greenlee, 6 Spdls. (1941)
No. 61 New Britain 6 Spdls. 1⅛" (1942)
No. 6 Brown & Sharpe, M.D.
No. 49 New Britain, 4 Spdl. Chucker
Model A 1½" Cleveland (1943)
Model A 3¾" Cleveland (1942)

DRILLS
No. 150 Baker, (1942)
No. D8 Colburn, No. 6 Morse Taper
No 2—26" Defiance #5 Taper (1943)
No. 4-BM Fosdick 4 Spdl. (1942)
No. 4-BM Fosdick 6 Spdl. (1942)
No. 1-LMS Leland-Gifford (1942)
No. 2-LMS Leland-Gifford (1942)
No. 4BL Natco 36 Spdl. (1943)
5' Western Heavy (1942)
6'-17" Fosdick Hyd. Economax Radial

GEAR MACHINES
No. 61-A Fellows Gear Shaper (1942)
No. 71-A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 72 Fellows Gear Shaper
No. 18H Gould & Eberhardt
72" Cincinnati Gear Cutter

BORING MACHINES
No. 360-F Giddings & Lewis 6" bar
No. 2 Lambert 4" bar
No. 31 Lucas 3" bar, M.D.
No. 46-B Heald Bore-Matic (1942)
No. 112—C Excello 2 Spdl. (1942)
36" Bullard Hi-Speed (1942)
42" Bullard (1944)
42" Colburn, M.D.
60" Colburn, M.D.
84" Betts, M.D.

GRINDERS
3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
10"x96" Landis type C hydraulic (1942)
Norton Motorized Grinders ranging from 6"x18" 24"x240"
12"x48" Cincinnati Univ. (1946)
No. 25—16" Heald Rotary Surf.
No. 36-A Hanchett Rotary Surf. (1942)
No. 72-A-3 Heald Internal (1942)
No. 72-A-5 Heald Internal (1942)
Bryant Internal Grinders (1942)

LATHES
14"x30" centers Pratt & Whitney, Model C
16"x54" centers LeBlond (1941)
18"x8' American, Gdr. Head, M.D.
16"x54" Monarch
20'x72" centers Monarch
36"—48"x16' Lehman Hydratrol (1945)
36"x24' Lodge & Shipley Gdr. Head
8"x15" Sundstrand, Model D (1943)
10" Sundstrands, (1942, 1943)
16" & 20" Fay Automatics (1942)
No. 2 Warner & Swasey, Bar Fd. (1942)
No. 4 Gisholt Univ. Turret Lathe, (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Oliver (1942)
No. 5 Midland, Bar Feed (1942)
No. 1-H Libby, Extra Long Bed (1942)

MILLING MACHINES
No. 2H Milwaukee Plain (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati H.P. Vertical
No. 1-16 Cincinnati Mfg. (1942)
No. 2—16" Cincinnati Rise & Fall (1941)
No. 3—18" Sundstrand-Electromil (1942)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex (1943)
No. 45-48 Cin. Hyd. Tracer (1941)
No. 56-72 Cincinnati Hydromatic
No. 56-90 Cincinnati Hydromatic
4½"x12" Pratt & Whit., Model C Thread Mill
6"x36" Lees-Bradner—Model HT (1943)
10"x48" Hanson-Whitney Thread (1942)
12"x24" H.T. Lees-Bradner (1942)
24"x24"x12' Ingersoll Adj. Rail Blab Miller
36"x24"x12' Ingersoll Duplex Miller (1946)
No. 10 Ingersoll 72"x6' Travelling Col. Face Millers (1942)
No. 28-60 Cincinnati Hydrotel

MISCELLANEOUS
18" Dill Slotter
Micromatic Vertical & Horizontal Hydrohoners

PLANERS
36"x36"x12' Cincinnati
36"x36"x18' Gray Maxi Service, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

Ask for our COMPLETE LIST

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

IN STOCK

Potter & Johnston #4D Timken Head, A.C. M.D. Chucker
Heald No. 49 Borematic, 2 Spindle Hydraulic Cross Table
Fisher, 5" Bar Floor Type Horizontal Boring Mill, AC-DC Drive
Gorton 3L—Three Dimensional Pantograph with Cutter Grinder
Bliss O.B.I. & Double Crank Presses
U. S. Tool Nos. 22, 25, 33 Multi-Slides
NILSON & BAIRD FOURSLIDES

National Machinery Exchange
128-138 Mott St., New York 13, N. Y.

LIKE NEW

24"x192" cc NORTON TYPE D Cylindrical Grinder, new in 1943, used less than 100 hours. Complete with all necessary motors and controls. Can be inspected under power. Replacement cost over $60,000.00.

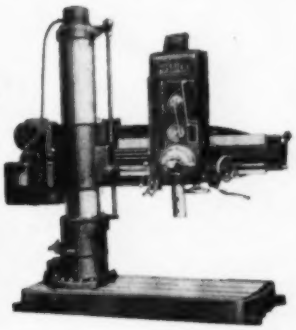
O'CONNELL MACHINERY CO.
1825 Niagara St., Buffalo 7, N. Y.

NORTON GRINDER
NORTON 6"x18" SEMI-AUTOMATIC CYLINDRICAL GRINDER, SERIAL #C 15275. MFG. 1941
PRICE $1,450.00.
Practically New
Inspection in our Warehouse. Excellent Condition
WINSTON MACHINERY CO., INC.
517 So. Delaware St., Indianapolis 4, Ind.

SIMMONS ENGINEERED Machine Tool REBUILDING NEWS

SIMMONS MACHINE TOOL CORPORATION · MAIN OFFICE AND PLANT, 1730 N. BROADWAY, ALBANY, N. Y.

Inspect Our Radial Drills



5' Arm 17" Col. Fosdick "ECONOMAX" Hydraulic Radial Drill. Spindle Speeds RPM 20 to 1406. Late type.

Write today for Complete Current Stock List of Simmons Engineered-Rebuilt Machine Tools

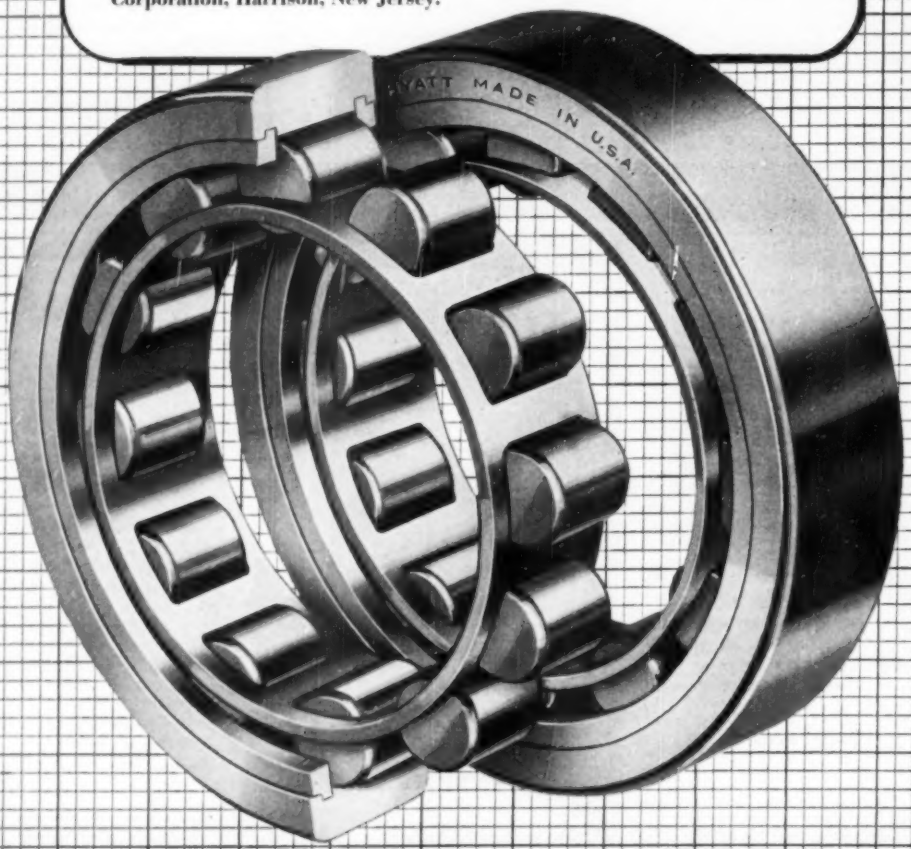
NEW YORK CITY OFFICE: 50 EAST 42nd STREET

Designed in . . . for life

The straight cylindrical construction of Hyatt Roller Bearings permits radial loads carried by the bearing to be evenly distributed over the entire length of the rollers. The larger area of contact between the load carrying elements in straight cylindrical bearings results in greater bearing capacity and longer life with less maintenance.

Size for size, Hyatt Hy-Load Roller Bearings offer maximum radial load carrying capacity. They are "designed in" for the life of your equipment.

To get the most out of the equipment you build, sell or buy, be sure that it is equipped with Hyatt Roller Bearings. Let us tell you more about what we can do for you. Write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



HYATT ROLLER BEARINGS

INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives, Coated.....30-31, 165, 190, 193

Accessories & Attachments (Machine Tool).....53, 55, 60, 221, 230, 238, 250, 252, 254, 258, 260

Arbors & Mandrels.....203, 261

Balancing Machines.....33, 34-35, 36

Balers, Scrap Metal.....38-39

Bearings.....4th Cover, 178, 185, 220, 228, 241, 276

Bending Machines.....236

Books, Technical.....246, 254, 260, 264

Boring, Drilling & Milling Machines (Horizontal).....14-15, 28-29, 59, 81

Boring Machines Internal.....2nd Cover

Boring & Turning Machines (Vertical).....61, 226

Broaching Machines.....82, 161, 187

Brushes.....148

Castings.....207

Centering Machines.....265

Centrifugal Machines.....238

Chucks.....55, 189, 195, 246, 263

Cleaning & Drying Machines & Supplies.....218, 238

Collets.....55, 263

Coolant Systems, Filters & Supplies...182, 242

Counters.....17

Cut-Off Machines; Sawing Machines..48, 71, 244, 265

Die Castings.....207

Dressers, Grinding Wheel.....145

Drilling Machines.....21, 44-45, 62, 64, 71, 76, 89, 94, 163, 180, 183, 194, 226, 232, 242, 252, 258

Electrical Parts & Equipment.....54, 180

Fabricating Methods & Services..222, 252

Fasteners.....43, 159, 200, 218, 242, 248

Gages & Instruments.....42, 169, 206, 219, 240, 243, 248, 263, 265

Gear Cutting Machines.....3, 6-7, 192, 265

Gears, Speed Reducers, Motor Reducers.....56, 214, 244, 246, 249, 254, 263, 264, 265

Gear Testers.....3, 6-7, 205

Grinders—Cutter & Tool.....71, 186, 240

Grinding Machines—Production.....4-5, 12-13, 18-19, 20, 53

Heads: Drilling, Grinding & Tapping..256

Heat Treating Equipment & Supplies..263

Honing Machines.....210, 250

Hydraulic & Pneumatic Parts & Equipment.....215, 217, 246

Lathes, Automatic.....3rd Cover, 27, 33, 34-35, 36, 51, 88, 235

Lathes, Engine.....50, 52, 57, 65, 74, 209, 229

Lathes, Turret.....33, 34-35, 36, 63

Lubricants, Cutting Fluids, Quenching Oils & Solvents.....49, 68, 79, 80, 150, 177, 199, 236, 253

Machines, Lapping.....18-19

Machines, Super Finishing.....33-34-35, 36

Marking Machines & Tools..174, 244, 264

Materials, Cutting & Forming..58, 145, 198, 211, 245, 278

Materials of Manufacture..58, 78, 83, 146, 167, 184, 191, 196, 198, 228, 246, 251, 278

Materials Handling Equipment.....77, 225, 255

Mechanical Parts & Equipment...66, 189, 195, 200, 221, 222, 225, 230, 238, 250

Millers, Die Sinkers, Profilers..8-9, 28-29, 175, 231

Motors, Electrical.....54

Nippling Machines.....10-11

Planers.....22-23, 85

Polishing & Buffing Machines.....18-19

Power Transmission.....16, 90, 237, 239

Presses, Forging & Forming Equipment & Supplies.....40-41, 47, 67, 72-73, 75, 179, 214, 224, 247, 250, 252, 257, 259, 261, 265, 266

Production, Inventory & Tool Control.176

Pumps, Circulating.....37, 265

Riveting Machines.....252, 263

Rust Preventives.....79, 80

Safety & Welfare Equipment & Supplies.....177, 258

Screw Machines; Chucking Machines.3d Cover, 51, 69, 70, 84, 235, 240

Shapers, Slotters, Keyseaters.....22-23, 96, 208, 265

Spindles, Machine.....203

Stampings.....200, 265

Steel Blue.....250

Tapping Attachments.....254

Tapping Machines.....44-45, 62, 64, 94, 180

Thread Cutting Machines...10-11, 262, 264

Tools, Cutting..24-25, 26, 32, 46, 48, 55, 60, 86-87, 181, 188, 189, 201, 202, 211, 216, 222, 223, 245, 256, 264, 265

Tools, Hand.....221

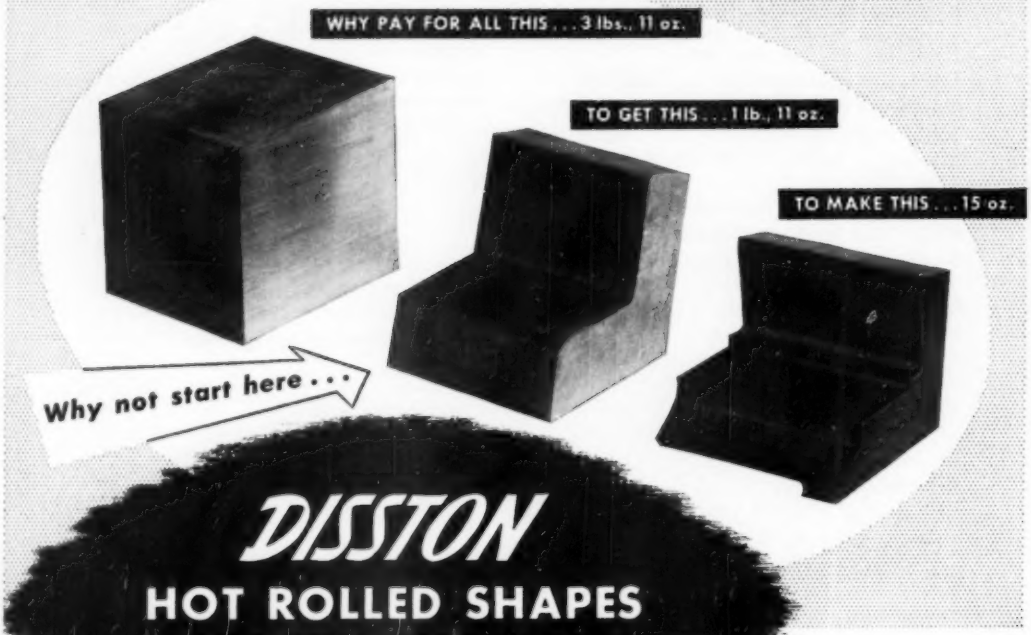
Tools, Portable.....204

Vises.....60, 189

Welding & Cutting, Brazing & Soldering Equipment & Supplies.173, 197, 248, 280

Wheels, Abrasive.....30-31, 152, 190, 193

HOW MUCH *high priced tool steel* do you WASTE?

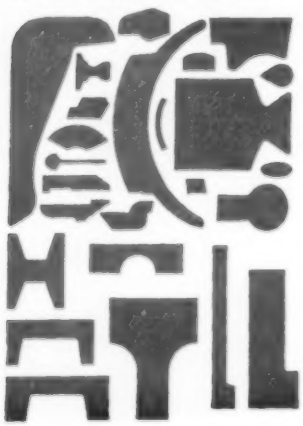


DISSTON HOT ROLLED SHAPES

SAVE METAL • SAVE WORK
SAVE TIME • SAVE MONEY

Knife of steel alloy containing 18% Tungsten, 4% Chrome and 1% Vanadium. Made from shape shown in center illustration.

DISSTON HOT ROLLED SPECIAL SHAPES ARE SUPPLIED IN MANY FORMS



Disston hot rolled special shapes are supplied in both alloy and carbon tool steels, and in electric and open hearth grades. All shapes are rolled to close tolerances and the finish is exceptionally fine.

Send us dimensional sketches of the shapes you require, together with the analysis and approximate quantities desired. Full particulars will be sent to you promptly.

Disston metallurgists and engineers will be glad to help you find the right solution to any of your tool steel problems.

HENRY DISSTON & SONS, INC.
220 Tacony, Philadelphia 35, Pa., U. S. A.

ADVERTISERS INDEX

	Page
Acromark Co.	264
Alemite	68
Allegheny Ludlum Steel Corp.	245
Allied Products Corp.	214
Allis-Chalmers Mfg. Co.	54
American Brass Co.	83
American Broach & Machine Co.	82
American Screw Co.	159
American Steel Foundries, King Machine Tool Division	61
American Tool Works	21
Armco Steel Corp.	146
Armstrong-Blum Mfg. Co.	48
Armstrong Bros. Tool Co.	60
Atlantic Gear Works, Inc.	264
Avey Drilling Machine Co.	183
Barber-Colman Co.	32
Barrett Co., Leon J.	238
Baumbach Mfg. Co., E. A.	265
Bay State Abrasive Products Co.	193
Behr Manning Corp.	30-31
Bilgram Gear & Machine Co.	265
Blanchard Machine Co.	20
Bliss Co., E. W.	47
Brinnell Co.	230
Brown & Sharpe Mfg. Co.	37, 53
Bryant Machinery & Engineering Co.	65
Buckeye Brass & Mfg. Co.	196
Buckeye Tools Corp.	204
Buffalo Forge Co.	258
Bullard Co.	59
Bunting Brass & Bronze Co.	228
Carboloy Co.	211
Carlton Machine Tool Co.	252
Carlyle Johnson Machine Co.	66
Carpenter Steel Co.	58
Cincinnati-Bickford Tool Co.	89
Cincinnati Gear Co.	244
Cincinnati Gilbert Machine Tool Co.	232
Cincinnati Grinders Incorporated	4-5
Cincinnati Lathe & Tool Co.	50
Cincinnati Shaper Co.	96
Cleveland Punch & Shear Works Co.	224
Cleveland Twist Drill Co.	46
Colonial Broach Co.	161
Columbus Die Tool & Machine Co.	252
Cone Automatic Machine Co.	51
Consolidated Machine Tool Corp.	55
Curtis Universal Joint Co.	250
Cushman Chuck Co.	195
Danly Machine Specialties, Inc.	75
Davis & Thompson Co.	242
Davis Keyseater Co.	264
Dayton Rogers Mfg. Co.	265
Dearborn Gage Co.	169
Delta-Rockwell Power Tool Division	71
Dempster Brothers, Inc.	38-39
Disston & Sons, Inc., Henry	278
Dodge Mfg. Corp.	220
Dow Chemical Co.	177
DuPont de Nemours & Co., Inc., E. I. Electrochemicals Dept.	49
Dykem Co.	250
Earle Gear & Machine Co.	246
Eastern Machine Screw Corp.	264
Eclipse Pioneer Div. Foundries Bendix Aviation Corp.	207
Erickson Tools	263
Ettco Tool Co.	254
Ex-Cell-O Corporation	222
Fafnir Bearing Co.	185
Federal Products Corp.	243
Fellows Gear Shaper Co.	6-7
Formica Co.	246
Fosdick Machine Tool Co.	76
Frasse & Co., Inc., Peter A.	251
Fulmer Co., C. Allen	250
Gallmeyer & Livingston Co.	240
Ganschow Gear Co.	263
Garrett Co., Geo. K.	200
Gates Rubber Co.	237
Gear Specialties	56
Giddings & Lewis Machine Tool Co.	14-15
Gisholt Machine Co.	33, 34-35, 36
Gleason Works	3
Globe Gear Co.	265
Goggle Parts Co., Inc.	258
Gorham Tool Co.	256
Goss & deLeeuw Machine Co.	240
Grant Gear Works	214
Grant Mfg. & Machine Co.	263
Gray Co., G. A.	85
Green Instrument Co.	244
Greenlee Brothers	84
Grob Brothers	263
Hamilton Tool Co.	192
Hanson Whitney Machine Co.	201
Harnischfeger Corp.	197
Hartford Special Machinery Co.	64
Haynes Stellite Co.	223
Heald Machine Co.	2nd Cover
Hebert Equipment Co.	265
Henry & Wright Div. of Hartford-Empire Co.	259
Hones, Inc., Charles A.	263
Houghton & Co., E. F.	253
Hyatt Bearings Div., Gen. Motors Corp.	276
Hydraulic Press Mfg. Co.	179
Hypro Tool Co.	202
Hyster Co.	77
Johnson Bronze Co.	178
Johnson Machine Co., Carlyle	66
Jones & Lamson Machine Co.	63
Kearney & Trecker Corp.	28-29
Kennametal Inc.	181
Kent-Owens Machine Co.	175
King Machine Tool Div., American Steel Foundries	61
Kester Solder Co.	248
Kingsbury Machine Tool Corp.	44-45
Kling Bros. Engineering Works	244
Knight Machinery Co., W. B.	231
Lake Erie Engineering Corp.	40-41
Laminated Shim Co., Inc. Ancorlox Div.	242
Landis Machine Co.	10-11
Landis Tool Co.	12-13
LaPointe Machine Tool Co.	187
LeBlond Machine Tool Co., R. K.	57
LeBryan Group Products Ltd.	264
Lees-Bradner Co.	262

Results Beyond Specifications!

Single bend tips can be supplied with bends of varying degrees from 0° to 45° and in varying over-all lengths at minimum costs. Illustrated is a cross-section of the many combinations of angles and over-all lengths available.

*Cross-section illustrating the exclusive Mallory Fluted water hole.**

REASONS WHY MALLORY FLUTED TIPS ARE SETTING WELDING RECORDS

- 70% increase in cooling area.
- Faster heat dissipation.
- Reduced mushrooming.
- Less frequent dressing.
- More rigidity.

Available in all types of tips with #1, #2, and #3 Morse tapers.

Mallory Fluted Single Bend Tips For Resistance Welding

Last Longer, Cost Less!

Mallory continues to develop more perfect resistance welding tools . . . products of research and testing facilities which are unequalled in the field.

A good example of practical product improvement is the new Mallory Fluted Single Bend Tip for gun and special welding applications . . . cold-formed from rod stock tips . . . therefore possessing physical and mechanical properties superior to forgings or castings. This in combination with the record-setting Mallory fluted water hole gives you a combination of unbeatable features in a variable range of angles and over-all lengths.

That's results beyond specification!

Mallory's resistance welding know-how is at your disposal. What Mallory has done for others can be done for you! Write for Bulletin RW-1049, which gives full specifications.

West Coast Office and Warehouse: 1338 So. Lorena St., Los Angeles 23, California

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Capacitors	Contacts
Controls	Resistors
Rectifiers	Vibrators
Special Switches	Power Supplies

Resistance Welding Materials

*Patent Pending

ADVERTISERS INDEX

	Page
Leland-Gifford Co.	163
Lincoln Electric Co.	173
Link Belt Co.	16
Linley Brothers Co.	252
Lodge & Shipley Co.	52
Logansport Machine Co.	246
Lucas Machine Division, New Britain Machine Co.	81
Luers, J. Milton	265
Madison Mfg. Co.	216
Mallory & Co., Inc., P. R.	280
Manheim Mfg. & Belting Co.	239
Marvin Machine Products	258, 260
McCaskey Register Co.	176
McGraw-Hill Book Co., Inc.	254, 260, 264
Mechanite Metal Corp.	209
Meisel Press Mfg. Co.	254
Metal Carbides Corp.	261
Michigan Abrasive Co.	190
Micromatic Hone Corp.	210
Midland Steel Products Co.	248
Minnesota Mining & Mfg. Co.	165
Modern Tool Works	55
Moline Tool Co.	180
Monarch Machine Tool Co.	74
Morris Machine Tool Co.	94
Motch & Merryweather Machinery Co.	170
National Acme Co.	69, 70
National Automatic Tool Co.	62
National Broach & Machine Co.	205
National Machinery Co.	257
National Twist Drill & Tool Co.	25
Newark Gear Cutting Machine Co.	265
New Britain-Gridley Machine Co.	3rd Cover
Niagara Machine & Tool Works	72-73
Noble & Westbrook Mfg. Co.	174
Norton Co.	18-19
OK Tool Co.	86-87
Oakite Products Inc.	238
Oliver Instrument Co.	186
Osborn Mfg. Co.	148
Ott & Co., Ltd., E.	262
Parker Rust Proof Co.	218
Philadelphia Gear Works	249
Pioneer Pump & Mfg. Co.	265
Pope Machinery Co.	203
Potter & Johnston Co., Sub. Pratt & Whitney Div., Niles-Bement-Pond Co.	27
Pratt & Whitney Div., Niles-Bement-Pond Co.	26
Reeves Pulley Co.	90
Republic Steel Corp.	191
Revere Copper & Brass Inc.	167
Rockford Machine Tool Co.	22-23
Rogers Machine Works	226
Ruthman Machinery Co.	242
Ryerson & Sons Inc., Joseph T.	184
Sales Service Machine Tool Co.	266
Scherr Co. Inc., George	263
Schrader's Son, A.	217
Seneca Falls Machine Co.	88
Sheffield Corp.	145
Shore Instrument & Mfg. Co., Inc.	265
Sibley Machine & Foundry Corp.	194
Simonds Abrasive Co.	152
Smith & Mills Div., Hamilton Thomas Corp.	208
South Bend Lathe Works	229
Springfield Machine Tool Co.	65
Standard Oil of California	199
Standard Oil Co. (Indiana)	79, 80
Standard Pressed Steel Co.	78
Stewart Warner Corp.	68
Strong, Carlisle & Hammond Co.	218
Struthers Wells Corp.	236
Stuart Oil Co., D. A.	236
Sun Oil Co.	150
Taft-Peirce Mfg. Co.	219
Timken Roller Bearing Co.	4th Cover
Torrington Co.	241
Tubular Micrometer Co.	248
Union Carbide & Carbon Corp.	223
United States Drill Head Co.	256
U. S. Hoffman Machinery Corp.	182
United States Steel Supply Corp.	198
Universal Engineering Corp.	189
V & O Press Co.	247
Van Keuren Co.	42
Van Norman Co.	8-9
Veeder-Root Inc.	17
Verson Allsteel Press Co.	282
Vickers Inc.	215
Waldes Koh-I-Noor Inc.	43
Waltham Machine Works	252
Warner & Swasey Co.	235
Webber Gage Co.	206
Wendt-Sonis Company	188
Westinghouse Electric Corp.	180
Williams & Co., J. H.	221
Wilson Co., K. R.	67
Wilson Mechanical Instrument Co.	240
Winter Brothers Co.	24
Wittek Manufacturing Co.	238
Yale & Towne Manufacturing Co.	255
Yoder Co.	225
Zeh & Hahnemann Co.	250

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT	Page
Positions Vacant	266
Selling Opportunities Offered	266
Positions Wanted	266
Selling Opportunities Wanted	267
Employment Services	266
SPECIAL SERVICES	
Contract Work	267
Francis Metal Products Corp.	267
General Pattern Works	267
BUSINESS OPPORTUNITIES	
Offered	267
EQUIPMENT	
(Used or Surplus New)	
For Sale	267-275
WANTED	
Equipment	267

ADVERTISERS INDEX

Aaron Machinery Co.	273
Avico, Inc.	267
Bennett Machinery Co.	272
Botwinik Bros. of Mass., Inc.	272
Brownell, Hazard Machine Tools, Inc.	268
Cincinnati Machinery Co., The	272
Continental Salvage & Machy. Corp.	267
Dony Machinery Co., D. E.	267
Eastern Machinery Corp.	268
Falk Machinery Co.	269
Hill-Clarke Machinery Co.	275
Hyman & Son, Joseph	274
Indianapolis Machy. & Supply Co.	274
Kings County Machinery Exchange	272
Macdell Corp.	267
Miles Machinery Co.	274
Morey Machinery Co.	271
Mutual Positions Plan Associates	267
National Machinery Exchange	275
Neil Equipment Co.	270
O'Connell Machinery Co.	267, 275
Osborne & Sexton Machinery Co.	268
Paul's Machinery Co.	268
Sales Service Machine Tool Co.	268
Schneir & Co., Inc., Julius J.	267
Seaboard Steel Co., Inc.	270
Snow Co., Ferdinand J.	272
Simmons Machine Tool Co.	275
State Machinery Co., Inc., The	270
United Machinery & Tool Corp.	270
Wahlstrom, C.	267
West Penn. Machinery Co., Inc.	268
Wigglesworth Machinery Co.	274
Winston Machinery Co., Inc.	267, 268, 275

TRADE Verson MARK

O. B. I. PRESSES

offer

BETTER PERFORMANCE

with Greater

OVERALL ECONOMY

The recent expansion of the Verson line of open back inclinable presses now makes the advantages of Verson engineering and construction available to a larger number of press users. Six models, rated in maximum capacity at 105, 125, 150, 180, 210 and 250 tons respectively, are now available. All offer liberal stroke length, depth of throat and slide and bed area. All are ruggedly built to assure accuracy, dependability and long life.

Whether you need a single press or a complete ultra-modern plant complete with tooling, Verson engineers will be pleased to help you select the proper press to meet your requirements. Send a description of the jobs you must handle and we will make specific recommendations.

Verson Bulletin No. OBI-49 describes design features and gives specifications for all Verson O.B.I. Presses. If you do not yet have a copy write for one today.

Originators and Pioneers of Allsteel Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9316 South Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP!

BLANKING PRESSES • FORGING PRESSES • DRAWING PRESSES • HYDRAULIC PRESSES
TRANSMAT PRESSES • PRESS BRAKES • DIES • DIE CUSHIONS • COMPRESSION MOLDING MACHINES

Said Mr. Hamilton* to Mr. Jones**

*Typical New Britain Sales Engineer
**Typical Industrial Executive

I only wish I could see my way clear to buy some new equipment. Some of my stuff's pretty old. What do they save on a job like that?

Well, first off they save operators. Then there's floor space and maintenance. Of course, you've got to consider the savings made on tooling and set-up of five machines against one. All in all they make the piece a lot cheaper on one automatic . . . and maintain the production rate and quality, too.

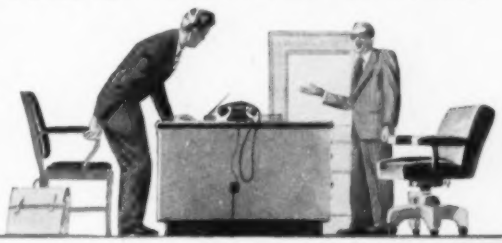
How much down-time for loading? That piece is over a foot long.

We licked that problem with an automatic, magazine-fed stock reel. It automatically loads all six spindles in less than a minute.

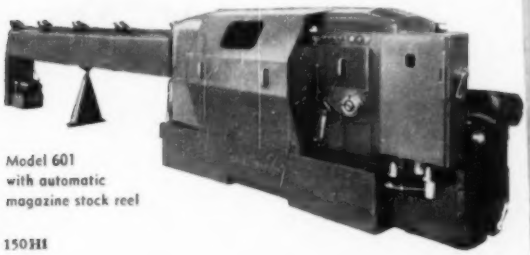
That sort of performance is impressive. I've been reading that our national average age of machines is on the way up again.

And we can't maintain the productivity we must have with over-age machines. This "modernize or die" business is no mere slogan!

What say we take a stroll through the shop right now. You might spot a job where we could save with automatic methods.



Call on your New Britain Sales Engineer to help you discover profit opportunities in metal cutting. Meanwhile, let us send you "It Can Be Done" with up-to-date cost histories on specific pieces.



Model 601
with automatic
magazine stock reel

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

150HI

How to put precision right on the spindle nose

SPINDLE precision is assured in the Bullard-Universal Horizontal Boring Machine by using Timken® tapered roller bearings on the spindle. And Timken bearings in the drive mechanism keep shafts turning and gears meshing smoothly under all operating conditions.

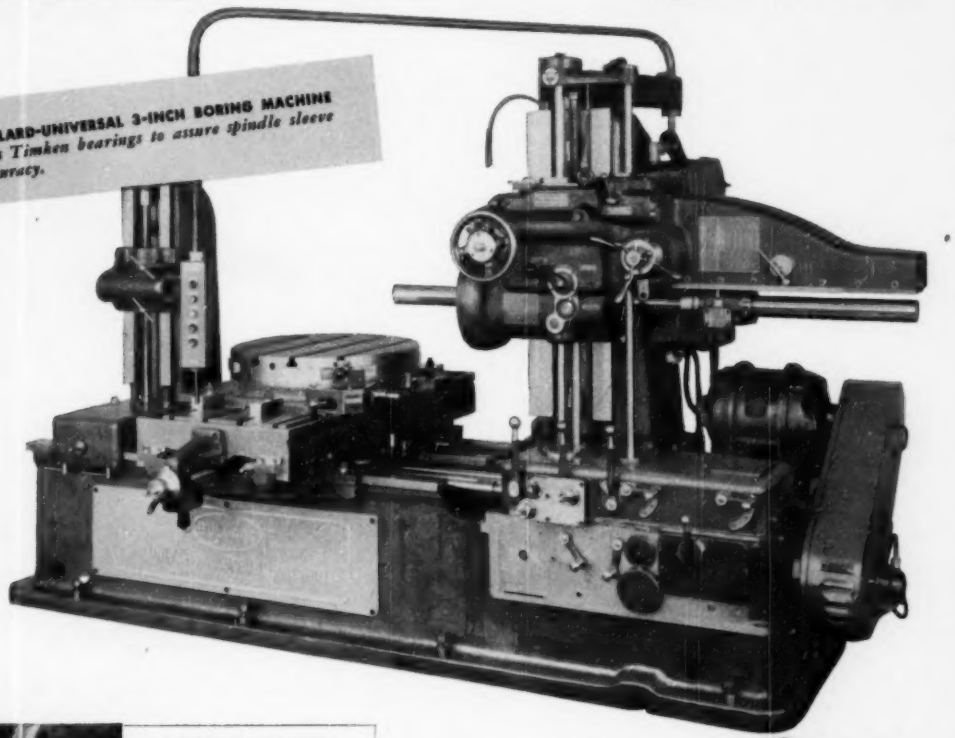
Timken bearings hold spindles in positive alignment under the heaviest loads. Bearings are accurately preloaded to predetermined engineering limits. The tapered construction of Timken bearings carries radial and thrust loads in any combination, eliminating end-play.

Line contact between the rolls and races of Timken bearings provides maximum load carrying capacity. The rolls and races are made from Timken fine alloy steel for toughness—then case-hardened to provide wear-resistant surfaces. Because Timken bearings are manufactured to extreme precision and finished to almost incredible smoothness, friction virtually is eliminated.

Remember, no other bearing can bring you *all* the advantages you get with Timken tapered roller bearings. Whether you build machine tools or buy them, always be sure they're Timken bearing equipped. Look for the trade-mark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

BULLARD-UNIVERSAL 3-INCH BORING MACHINE *uses Timken bearings to assure spindle sleeve accuracy.*



FINISHED TO CLOSER TOLERANCES

Finishing to incredible smoothness accounts for much of the precise, smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly accurate manufacturing methods at Timken.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊃ THE TIMKEN TAPERED ROLLER ⊃ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION →◫←